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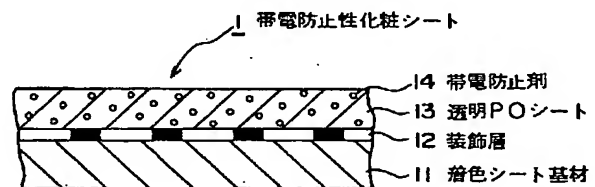
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(54) 【発明の名称】 帯電防止性化粧シート

(57) 【要約】

【課題】 ポリオレフィン系樹脂を使用した化粧シートは、表面抵抗が大きく、帯電し易いため、ワイピング加工やオーバープリント等の後工程において、静電気の発生により、火災発生の原因となることがある。また、帯電した化粧シートは塵埃が付着し易く、不良品の発生原因となると共に衛生上の問題も生じる。

【解決手段】 着色剤、無機充填剤等をブレンドしたポリオレフィン系樹脂を用いて、押し出し加工法等により着色シート基材11を作製し、この着色シート基材11に印刷等により装飾層12を設ける。次に、この着色シート基材11の装飾層12側に、界面活性剤等の帯電防止剤14を0.1～1重量%含有する透明POシート13をラミネートして、帯電防止性化粧シート1を作製する。



## 【特許請求の範囲】

【請求項1】 着色シート基材、装飾層、透明樹脂層を積層した化粧シートにおいて、該透明樹脂層がオレフィン系樹脂からなり、且つ帯電防止剤を0.1～1重量%含有し、該化粧シートの表面抵抗値が $10^{14}\Omega$ 以下であることを特徴とする帯電防止性化粧シート。

【請求項2】 前記着色シート基材が、オレフィン系樹脂からなり、且つ少なくとも、着色剤、帯電防止剤を含有していることを特徴とする請求項1に記載の帯電防止性化粧シート。

【請求項3】 前記帯電防止剤が界面活性剤であり、該界面活性剤が前記オレフィン系樹脂と適度の相溶性を有し、オレフィン系樹脂内を移動できる性質を有することを特徴とする請求項1及び請求項2に記載の帯電防止性化粧シート。

## 【発明の詳細な説明】

## 【0001】

【発明の属する技術分野】本発明は、建築物の内装、建具の表面化粧、車両内装等に用いる表面化粧シートとして利用可能な化粧シートに関するものである。

## 【0002】

【従来の技術】従来、基材シートの表面に熱可塑性樹脂からなる表面樹脂層を設けた化粧シートが公知である。例えば、特開昭51-34967号公報には、任意の模様を印刷した紙や不織布等の多孔性基材の表面に、塩化ビニル系樹脂又はポリオレフィン系樹脂等の熱可塑性樹脂を溶融押し出ししてラミネートした化粧シートが開示されている。

【0003】また、近年、塩化ビニル樹脂に代わるものとして、ポリエチレン、ポリプロピレン等のポリオレフィン系シートを使用した化粧シートが提案されている（特開昭54-62255号公報参照）。例えば、隠蔽性を有するポリオレフィン系樹脂からなるシート基材の表面に、絵柄印刷層、接着剤層、熱可塑性透明エラストマーフィルムを順次積層し、積層と同時にエンボス加工を施して表面にエンボス模様を設けたエンボス化粧シート（特開平6-79830号公報）や、隠蔽性を有するポリオレフィン系樹脂からなるシート基材に絵柄層を設け、これにポリオレフィン系の透明樹脂を押し出しラミネートすると同時にエンボス加工によりエンボス凹部を設け、該エンボス凹部にワイピング加工により、着色インキを充填した化粧シート（特開平6-79850号公報）等が提案されている。更に、前記ポリオレフィン系樹脂シートの改良仕様として、極性官能基をグラフト重合させたポリオレフィン系樹脂に、オレフィン系熱可塑性エラストマーを混合させたもの（特開平6-21080号公報、特開平4-504384号公報）、或いは、ポリオレフィン系樹脂に相溶化剤を用いてポリウレタン樹脂を混合させたもの（特開平7-26038号公報）、等も提案されている。

## 【0004】

【発明が解決しようとする課題】しかし、ポリ塩化ビニルやポリオレフィン系樹脂を使用した化粧シートは、静電気が発生し易く塵埃やゴミが付着し易い。特に、ポリオレフィン系樹脂を使用した化粧シートは、表面抵抗が大きいと帯電し易く、ワイピング加工やオーバープリントコート（以下OPコートとする）等の後工程において、静電気が発生し、その静電気のスパークにより火災発生の原因となることがある。また、帯電した化粧シートは、塵埃やほこりが付着し易くなり、衛生的問題が生じると共に、不良品の発生の原因となる。通常、空気中の細菌やカビ等の微生物は、単独で存在することは殆どなく、ゴミ又は塵に付着して存在することが多いため、帯電し易い従来の化粧シートは細菌やカビ等に汚染され易くなる。

【0005】本発明は、これらの問題を解決するために、化粧シートの表面に帯電防止剤を含有する樹脂層を形成して化粧シートの表面抵抗を減少し、静電気のスパークによる火災発生を防止すると共に、ゴミや塵の付着を防止する。更に、付着したゴミや塵は拭き取りや水洗等により容易に除去できるようになるので、化粧シートの表面は長期間にわたって清潔な状態を維持できるようになる。

## 【0006】

【課題を解決するための手段】上記問題を解決するために、化粧シートの構成を以下のようにした。着色シート基材、装飾層、透明樹脂層を積層した化粧シートにおいて、該透明樹脂層がオレフィン系樹脂からなり、且つ帯電防止剤を0.1～1重量%含有し、該化粧シートの表面抵抗値が $10^{14}\Omega$ 以下であることを特徴とする帯電防止性化粧シートとした。また、前記着色シート基材が、オレフィン系樹脂からなり、且つ少なくとも、着色剤、帯電防止剤を含有している帯電防止性化粧シートとした。更に、前記帯電防止剤として界面活性剤を用い、該界面活性剤が前記オレフィン系樹脂と適度の相溶性を有し、オレフィン系樹脂内を移動できる性質を有するものを選定した。

【0007】即ち、化粧シートの表面の樹脂層を、帯電防止剤を0.1～1重量%含有する透明なオレフィン系樹脂を用いて形成し、化粧シート表面の表面抵抗値が $10^{14}\Omega$ 以下になるようにして、帯電防止性能を有する化粧シートとしたものである。また、化粧シートの表面だけでなく、着色シート基材にも帯電防止剤を含有するオレフィン系樹脂を用いて化粧シートを作製し、帯電防止性能を有する化粧シートとしたものである。そして、帯電防止剤として、オレフィン系樹脂と適度の相溶性を有し、オレフィン系樹脂内を自由に移動できる性質を有する界面活性剤を選定することにより、オレフィン系樹脂に混練された界面活性剤が化粧シート表面にブリードアウトして、表面の帯電を防止できるようにしたものである。

る。

【0008】

【発明の実施の形態】以下に、図面を参照しながら本発明を詳細に説明する。図1は本発明の帯電防止性化粧シートの一例を示した模式断面図である。図2は本発明の帯電防止性化粧シートの別の態様で、表面の透明な樹脂シートと着色シート基材の両方に帯電防止剤を含有する帯電防止性化粧シートの模式断面図である。図3は本発明の帯電防止性化粧シートの更に別の態様で、帯電防止剤を含有する透明な樹脂シートにエンボス模様を形成した帯電防止性化粧シートの模式断面図である。図4は帯電防止剤を含有する透明な樹脂シートと着色シート基材を、接着剤を介して積層したときの帯電防止性化粧シートの模式断面図である。図5は透明な樹脂シートと着色シート基材の両方に帯電防止剤を含有させて、この両方のシートを接着剤を介して積層したときの帯電防止性化粧シートの模式断面図である。図6は本発明の帯電防止性化粧シートを作製するときの一例を示した説明図である。図7は実施例1により本発明の帯電防止性化粧シートを作製するときの説明図である。図8は実施例2により本発明の帯電防止性化粧シートを作製するときの説明図である。図9は実施例3により本発明の帯電防止性化粧シートを作製するときの説明図である。図10は界面活性剤をアニオン系、カチオン系、非イオン系、両性系に分類した表である。

【0009】本発明の帯電防止性能を有する化粧シート（以下単に帯電防止性化粧シートとする）1は、図1に示すように、着色シート基材11、装飾層12、及び帯電防止剤14を含有する透明なポリオレフィン系樹脂シート（以下透明POシートとする）13から構成される。また、図2に示すように、着色シート基材にも帯電防止剤を含有したものとして、帯電防止剤14を含有する着色したポリオレフィン系樹脂シート（以下着色POシートとする）11a、装飾層12、及び帯電防止剤14を含有する透明POシート13から構成される帯電防止性化粧シート1とすることもできる。更に、図3に示すように、帯電防止剤14を含有する透明POシートにエンボス模様15を形成して帯電防止性化粧シート1とする場合もある。

【0010】また、図4に示すように、着色シート基材と帯電防止剤を含有する透明POシートを接着剤を用いてラミネートする仕様として、着色シート基材11、装飾層12、接着剤層15、及び帯電防止剤14を含有する透明POシート13から構成される場合もある。更に、接着剤を用いた仕様として、図5に示すように、帯電防止剤14を含有した着色シート基材11、装飾層12、接着剤層15、及び帯電防止剤14を含有する透明POシート13から構成されることもある。

【0011】以下に、本発明の帯電防止性化粧シートの製造方法について説明する。まず、図6（a）に示すよ

うに、着色シート基材11として、着色剤及び無機充填剤等をブレンドした熱可塑性樹脂を用いて、押し出し加工法、カレンダー法等により着色シートを作製する。次いで、この着色シート基材11に、グラビア印刷等により木目柄等を印刷して、図6（b）に示すように、装飾層12を形成する。一方、図6（c）に示すように、ポリエチレンやポリプロピレン等のポリオレフィン系樹脂に帯電防止剤14を0.1～1重量%の範囲で添加し、この帯電防止剤を含有したポリオレフィン系樹脂を用いて、押し出し加工法等によりシート化し、帯電防止剤14を含有した透明POシート13を作製する。次に、図4（d）に示すように、前記装飾層12を設けた着色シート基材11と帯電防止剤14を含有した透明POシート13を、接着剤層16を介してドライラミネーション法等により貼り合わせて、帯電防止性化粧シート1を作製する。

【0012】また、前記と同様に、装飾層12を設けた着色シート基材11と帯電防止剤14を含有した透明POシート13を作製した後、この両者のシートをエンボスロールを用いてダブリングエンボス法によって積層し、図3に示すように、表面にエンボス模様を形成した帯電防止性化粧シート1を作製することもできる。

【0013】更に、本発明の別の態様として、前述のように、帯電防止剤と着色剤を添加したポリオレフィン系樹脂を用いて、押し出し加工法等により、図6（a）に示すように、着色POシート11aを作製し、この帯電防止剤を含有した着色POシート基材11aに、図6（b）に示すように、装飾層12を設ける。この着色POシート11aの装飾層12側に、帯電防止剤14を含有するポリオレフィン系樹脂を溶融押し出ししてラミネートし、図2に示すような帯電防止性化粧シートを作製することもできる。また、帯電防止剤14を含有した着色POシート11aと帯電防止剤14を含有した透明POシート13を別々に作製し、着色POシート11aに装飾層12を設けた後、この両者のシートを接着剤層16を介して積層して、図5に示すような帯電防止性化粧シート1を作製することもできる。

【0014】本発明における着色シート基材は、ポリオレフィン系樹脂シート又はフィルム（以下本発明においてシートという場合はフィルムも含むものとする）、或いは紙等の繊維質シートが用いられる。ポリオレフィン系樹脂シートの樹脂としては、ポリエチレン（以下PEとする）、ポリプロピレン（以下PPとする）、エチレン・プロピレン共重合体、エチレン・ブテン-1共重合体、プロピレン・ブテン-1共重合体、ポリブテン-1、ブテン-1・プロピレン・エチレンの3元共重合体、ブテン-1・ヘキセン-1・オクテン-1の3元共重合体、ポリメチルペンテン、ポリオレフィン系熱可塑性エラストマー等が挙げられる。これらの樹脂は、単独でも、二種以上混合してもよい。

【0015】本発明においては、上記ポリオレフィン系樹脂に顔料又は染料からなる着色剤をブレンドし、この着色樹脂を用いて押し出し加工等によりシートを作製し、着色シートとして使用する。シートの厚さは50～500 $\mu$ m程度で、延伸シート、未延伸シートのいずれも使用可能であるが、Vカット加工等化粧シートの後加工において、未延伸シートの方が成形適性等の点で優れている。シートの着色は、用途に応じて、透明着色、不透明（隠蔽）着色いずれでも使用可能であるが、一般的には、被着体の表面を隠蔽する必要があり、不透明着色が好ましい。

【0016】また、着色シート基材には、必要に応じて、炭酸カルシウム、アルミナ（酸化アルミニウム）、硫酸バリウム等の体質顔料（充填剤）、又は発泡剤、難燃剤、熱安定剤、紫外線吸収剤等を添加する場合がある。上記着色剤としては、チタン白、亜鉛華、弁柄、朱、群青、コバルトブルー、チタン黄、カーボンブラック等の無機顔料、イソインドリノン、ハンザイエローA、キナクリドン、パーマネントレッド4R、フタロシアニンブルー等の有機顔料或いは染料、アルミニウム、真鍮等の金属顔料、二酸化チタン被覆雲母、塩基性炭酸亜鉛等の箔粉からなる真珠光沢顔料等が用いられる。

【0017】上記ポリオレフィン系樹脂は、それ自体でも使用されるが、ポリオレフィン樹脂に柔軟性、耐衝撃性、易接着性を付与するために、好ましくは各種ゴム類を添加する場合がある。ゴム類としては、ジエン系ゴム、水素添加ゴム、ポリオレフィン系エラストマー等であるが、中でも水素添加ジエン系ゴムが好ましい。

【0018】水素添加ジエン系ゴムは、ジエン系ゴム分子の二重結合の少なくとも一部に水素原子を付加させてなるもので、ポリオレフィン系樹脂の改質剤として使用され、ポリオレフィン系樹脂の結晶化を抑え、柔軟性、透明性をアップさせる役割がある。一般に、ポリオレフィン系樹脂にジエン系ゴムを添加するとジエン系ゴムの二重結合のために、耐候性、耐熱性は無添加のポリオレフィン系樹脂より低下するが、本発明では、ジエン系ゴムの二重結合を水素添加で飽和させるため、ポリオレフィン系樹脂の耐候性、耐熱性の低下もなく良好なものとなる。

【0019】上記ジエン系ゴムとしては、イソブレンゴム、ブタジエンゴム、ブチルゴム、プロピレン・ブタジエンゴム、アクリロニトリル・ブタジエンゴム、アクリロニトリル・イソブレンゴム、スチレン・ブタジエンゴム等がある。本発明の目的からは、スチレン・ブタジエンゴムが好ましい。添加量としては、ポリオレフィン系樹脂100重量部に対して、1～90重量部程度がよい。添加量が1重量部未満だと、ゴム添加による弾性、伸び率、耐衝撃性が不足し、Vカット加工、絞り加工等の折り曲げ加工の際に、亀裂、割れを生じ易くなり、ジエン系ゴムの添加効果が出ない。また、添加量が90重

量部を超えると、弾性、伸び率が大きくなり過ぎて、印刷時の見当合わせが困難となり好ましくない。

【0020】ポリオレフィン系エラストマーとしては、2種類又は3種以上のオレフィンと共重合しうるポリエンを少なくとも1種加えた弾性共重合体であり、オレフィンはエチレン、プロピレン、 $\alpha$ -オレフィン等が使用され、ポリエンとしては、1,4-ヘキサジエン、環状ジエン、ノルボルネン等が使用される。好ましいオレフィン系共重合体としては、例えば、エチレン・プロピレン共重合体ゴム、エチレン・プロピレン・非共役ジエンゴム、エチレン・ブタジエン共重合体ゴム等のオレフィンを主成分とする弾性共重合体が挙げられる。ポリオレフィン系エラストマーの添加量としては、基材中に10～60重量%、好ましくは30重量%程度である。10重量%未満では、一定荷重時伸度の変化が急峻になり過ぎ、また破断時伸度、耐衝撃性の低下が生じる。添加量が60重量%を超えると透明性、耐候性及び耐クリープ性が低下する。

【0021】更に、本発明の基材シートとして好ましくは、高密度ポリエチレン樹脂、熱可塑性エラストマー、着色剤及び無機充填剤からなるシートが挙げられる。上記高密度ポリエチレンとしては、比重が0.94～0.96のポリエチレンであって、低圧法で製造されて結晶化度が高く、分子に枝分かれの少ない分子構造のものが用いられる。また、上記熱可塑性エラストマーとしては、ジエン系ゴム、水素添加ジエン系ゴム、ポリオレフィン系エラストマー等が用いられる。熱可塑性エラストマーの添加量としては、基材中に10～60重量%、好ましくは30重量%程度である。10重量%未満では、一定荷重時伸度の変化が急峻になり過ぎ、また、破断時伸度、耐衝撃性の低下が生じる。添加量が60重量%を超えると透明性、耐候性及び耐クリープ性が低下する。

【0022】高密度ポリエチレンに添加する無機充填剤としては、炭酸カルシウム、硫酸バリウム、クレイ、タルク等の粉末が用いられる。添加量としては、基材シート中に5～60重量%、好ましくは30重量%程度である。5重量%未満では耐クリープ変形性及び易接着性が低下し、60重量%を超えると破断時伸度、耐衝撃性の低下が生じる。着色剤としては、前記と同様のものが用いられる。

【0023】前記ポリオレフィン系樹脂には、着色剤、各種ゴム類又はポリオレフィン系エラストマー、無機充填剤等を添加して樹脂混合物とし、この樹脂混合物を用いて押し出し法、又はカレンダー法等の公知の方法に従ってシート化し、不透明な着色POシートを作製する。着色POシートの厚さは50～500 $\mu$ mの範囲で使用されるが、好ましくは100～200 $\mu$ m程度である。

【0024】本発明に用いられる上記着色POシートの表面には、印刷インキ、透明なPOシート、接着剤との

接着力を向上するために、コロナ放電処理、プラズマ処理、易接着層の形成等の易接着性処理が施される。易接着層（プライマー層或いはアンカー層ともいう）としては、アクリル系樹脂、ウレタン系樹脂、塩化ビニル・酢酸ビニル共重合体系樹脂、ポリエステル樹脂、ポリウレタン樹脂、塩素化ポリエチレン、塩素化ポリプロピレン等の樹脂を溶媒に溶解した塗工液が使用されるが、特にポリウレタン樹脂を用いたものが望ましい。上記樹脂を溶媒に溶解した塗工液を、公知の方法で塗布、乾燥して易接着層とする。

【0025】基材シートとして用いられる繊維質シートとしては、坪量50～150g/m<sup>2</sup>の紙、織布、又は不織布からなるシートが挙げられる。その厚さは用途に応じて、50～300μmの範囲から選択することができる。繊維質シートを構成する繊維質素材としては、セルロースパルプ、麻、木綿、等の天然繊維、ナイロン、ポリプロピレン、ポリエステル等の有機質系の合成繊維、石綿、ガラス、石英、カーボン、チタン酸カリウム等からなる無機系の繊維が挙げられる。尚、セルロースパルプ繊維を用いた繊維質基材シートは、所謂、紙であり、具体的には、上質紙、クラフト紙、和紙等が挙げられる。基材シートが有機質繊維シートの場合、難燃剤として、水酸化アルミニウム粉末、又はアジリジニルホスフィンオキシド等のリン酸化合物等を混抄して、難燃処理が施される。

【0026】着色シート基材には、片面に印刷等により装飾層が形成される。装飾層としては、印刷による印刷模様、エンボス加工によるエンボス模様、ヘアライン加工による凹凸模様があり、更に、凹凸模様の凹部に公知のワイピング加工法によって着色インキを充填して装飾層を形成することもできる。印刷模様としては、木目柄、石目柄、布目柄、皮紋模様、幾何学図形、文字、記号、各種抽象模様、或いは全面ベタ印刷等がある。全面ベタ印刷の隠蔽層は化粧シートを貼付する被着体の表面状態によって省略されることがある。

【0027】模様印刷のインキとしては、印刷基材（着色POシート又は透明なPOシート）の材質や形態によって異なるが、一般的には、硝化綿、酢酸セルロース、塩化ビニル・酢酸ビニル共重合体、ポリビニルブチラル、ウレタン樹脂、アクリル樹脂、ポリエステル樹脂等の単独重合体、又は他のモノマーとの重合体をビヒクルとし、これと通常の顔料、染料等の着色剤、体質顔料、硬化剤、添加剤、溶剤等からなるインキが使用される。特に、本発明の化粧シートには、耐熱性、耐候性に優れたインキが、用途に応じて適宜選定される。

【0028】模様の印刷としては、グラビア印刷、凹版印刷、オフセット印刷、活版印刷、フレキソ印刷、シルクスクリーン印刷、静電印刷、インクジェット印刷等通常の印刷方式が使用できる。もしくは、別に離型性シート上に一旦絵柄模様を形成して転写シートを作成し、得

られた転写シートからの転写印刷方式によって模様印刷を転写して設けてもよい。また、印刷模様の代りに、アルミニウム、クロム、金、銀、銅等の金属を真空蒸着、スパッタリング等によって、着色シート基材又は透明なPOシートに、金属薄膜を全面又は部分的に形成して装飾層とすることもできる。

【0029】本発明における透明なオレフィン系樹脂層（透明POシート）としては、ポリオレフィン樹脂を主成分とするものが使用される。透明POシートの樹脂としては、ポリエチレン（以下PEとする）、ポリプロピレン（以下PPとする）、エチレン・プロピレン共重合体、エチレン・ブテンー1共重合体、プロピレン・ブテンー1共重合体、ポリブテンー1、ブテンー1・プロピレン・エチレン3元共重合体、ブテンー1・ヘキセンー1・オクテンー13元共重合体、ポリメチルペンテン、ポリオレフィン系熱可塑性エラストマー等が挙げられる。これらの樹脂は、単独でも、二種以上混合してもよい。

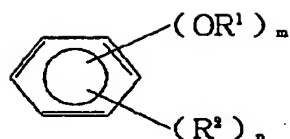
【0030】上記ポリオレフィン系樹脂は、それ自体でも使用されるが、ポリオレフィン樹脂に柔軟性、耐衝撃性、易接着性を付与するために、好ましくは各種ゴム類を添加する場合がある。ゴム類としては、ジエン系ゴム、水素添加ゴム、オレフィンエラストマー等であるが、中でも水素添加ジエンゴムが好ましい。水素添加ジエン系ゴムは、ジエン系ゴム分子の二重結合の少なくとも一部に水素原子を付加させてなるもので、ポリオレフィン系樹脂の改質剤として使用され、オレフィン樹脂の結晶化を抑え、柔軟性、透明性をアップさせる役割がある。

【0031】一般に、ポリオレフィン系樹脂にジエン系ゴムを添加するとジエン系ゴムの二重結合のために、耐候性、耐熱性は無添加のポリオレフィン系樹脂より低下するが、本発明では、ジエン系ゴムの二重結合を水素添加で飽和させるため、ポリオレフィン系樹脂の耐候性、耐熱性の低下もなく良好なものとなる。ポリオレフィン系樹脂に添加する各種ゴム類、及びポリオレフィン系熱可塑性エラストマーとしては、着色シート基材に用いられる前述の各種ゴム類、及びポリオレフィン系エラストマーが使用できる。

【0032】本発明における透明POシートの好ましい樹脂としては、アタクティックポリプロピレンとアイソタクティックポリプロピレンとの混合系からなる複合構造を有する無色又は着色透明な軟質ポリプロピレン樹脂が使用される。アタクティックポリプロピレンは、公知の方法（特開昭63-243106号公報）によって製造することができる。具体的には、（イ）マグネシウム、チタン、ハロゲン原子及び電子供与体を必須成分として含有する固体触媒成分、（ロ）有機アルミニウム化合物、及び（ハ）下記の一般式

【0033】

【化1】



〔式中の $R^1$ は炭素数1~20のアルキル基、 $R^2$ は1~10の炭化水素基、水酸基又はニトロ基、 $m$ は1~6の整数、 $n$ は0又は1~(6- $m$ )の整数である〕で表されるアルコキシ基含有芳香族化合物の組み合わせからなる触媒の存在下で、プロビレンを重合させることにより、所望のアタクティックポリプロビレンを得ることができる。

【0034】そして、アタクティックポリプロビレンは、沸騰ヘプタンに可溶性であり、数平均分子量( $M_n$ )が25,000以上、好ましくは30,000~60,000の範囲にあり、且つ重量平均分子量( $M_w$ )と数平均分子量( $M_n$ )との比( $M_w/M_n$ )が7以下、好ましくは2~6の範囲のものが用いられる。また、アイソタクティックポリプロビレンは、メルトフローレイト(MFR)が0.1~4g/10分で、沸騰ヘプタンに不溶性であるものが使用される。

【0035】上記アタクティックポリプロビレンとアイソタクティックポリプロビレンの混合物からなる軟質ポリプロビレンシート(以下軟質PPシートとする)は、破断伸び( $T_b$ )が400%以上、好ましくは500~700%、100%伸長後の残留伸び( $PS_{100}$ )が80%以下、好ましくは50~75%、及び破断時応力( $M_b$ )と降伏時応力( $M_v$ )との比 $M_b/M_v$ が1.0以上、好ましくは1.5~3.5の範囲にあることが望ましい。これらの力学的特性が前記範囲を逸脱すると本発明の目的が十分に達成されなくなる。

【0036】上記軟質PPシートを構成するアタクティックポリプロビレンは、数平均分子量( $M_n$ )が25,000未満のものや $M_w/M_n$ 比が7を超えるものは、該アタクティックポリプロビレンの力学的特性が十分発揮されず、得られたPPシートの破断時応力( $M_b$ )と降伏時応力( $M_v$ )との比 $M_b/M_v$ が1.0未満となり、100%伸長後の残留伸び( $PS_{100}$ )が80%を超えたりして、本発明の目的が達成されない。また、アイソタクティックポリプロビレンのMFRが0.1未満では熔融特性が低く、シート成形が困難になる。また、MFRが4g/10分を超えると機械的強度が不十分となってVカット加工適性が低下する。

【0037】上記アタクティックポリプロビレンは、プロビレンの単独重合体であってもよく、プロビレンの単量体と40重量%以下の他の炭素数2~30の $\alpha$ -オレフィン単位とを含有するプロビレン共重合体であってもよい。また、アタクティックポリプロビレンは1種用いてもよいし、2種以上を組み合わせてもよい。

【0038】また、上記アイソタクティックポリプロビレンは、立体規則性を有するプロビレンの単独重合体であってもよく、該立体規則性を有するプロビレンと他の $\alpha$ -オレフィンとの共重合体であってもよい。この共重合体に用いられる他の $\alpha$ -オレフィンとしては、例えば、エチレン、ブテン-1、ペンテン-1、ヘキセン-1、ヘプテン-1、オクテン-1等が好ましく、中でも、エチレン及びブテン-1が好適である。また、共重合体としては、前記の他の $\alpha$ -オレフィン単位を通常40重量%以下、好ましくは30重量%以下含有するブロック共重合体やランダム共重合体が用いられる。アイソタクティックポリプロビレンの好ましいものとしては、プロビレン単独重合体、及びエチレン単位1~30重量%、好ましくは3~25重量%を含有するプロビレンとエチレンとのランダム共重合体又はブロック共重合体が挙げられる。このようなアイソタクティックポリプロビレンの製造方法については特に制限はなく、従来、結晶性ポリプロビレンの製造と同様に行うことができる。

【0039】本発明に使用される透明な軟質PPシートにおいて、アイソタクティックポリプロビレンとアタクティックポリプロビレンの混合割合は、アタクティックポリプロビレンが10~90重量%、好ましくは25~80重量%であり、これに対してアイソタクティックポリプロビレンは90~10重量%、好ましくは75~20重量%である。(詳細には、例えば、特公平6-23278号公報に記載されている。)

アタクティックポリプロビレンが10重量%未満では、樹脂の降伏時応力( $M_v$ )が大きくなり過ぎて、破断時応力( $M_b$ )と降伏時応力( $M_v$ )との比 $M_b/M_v$ が1.0未満となり、且つ100%伸長後の残留伸び( $PS_{100}$ )も80%より大きくなって、本発明の目的が達成されない。一方、アタクティックポリプロビレンが90重量%を超えると、破断時応力( $M_b$ )が小さくなり過ぎて、破断時応力( $M_b$ )と降伏時応力( $M_v$ )との比 $M_b/M_v$ が1.0未満となり、且つ機械的強度が低下し、やはり本発明の目的が達成されない。

【0040】軟質PPシートにおけるアタクティックポリプロビレンとアイソタクティックポリプロビレンとの特に好ましい混合比率は1:1であり、アイソタクティックポリプロビレン成分の比率が高くなると、得られる軟質ポリプロビレンのヤング率が高くなる。このブレンドポリプロビレンには、化粧シートの表面層として求められる機能を補強するために、各種添加剤、補強材、充填剤、例えば、紫外線吸収剤、光安定剤、耐熱安定剤、酸化防止剤、帯電防止剤、難燃剤等が添加される。

【0041】紫外線吸収剤、光安定剤は、樹脂により耐候性(耐光性)を付与するためのものであり、その添加量は紫外線吸収剤、光安定剤、共に0.01~1.5重量%程度である。一般的に、紫外線吸収剤と光安定剤とを併用するのが好ましい。紫外線吸収剤としては、ベン



ソトリアゾール、ベンゾフェノン、サリチル酸エステル等の有機物、又は、0.2  $\mu\text{m}$ 以下の微粒子状の酸化亜鉛、酸化セリウム、酸化チタン等の無機物を用いることもできる。安定剤としては、ビスー(2, 2, 6, 6, -テトラメチル-4-ビペリジニル)セバケート等のヒンダードアミン系ラジカル捕捉剤、ビペリジン系ラジカル捕捉剤等のラジカル捕捉剤を用いることができる。

【0042】上記アイソタクティックポリプロピレンとアタクティックポリプロピレンの混合系からなる軟質ポリプロピレンに紫外線吸収剤、光安定剤等各種添加剤を添加した混合物をカレンダー法等の公知の方法に従って製膜して、無色又は着色透明な軟質PPシートを作製する。軟質PPシートの厚さは50~200  $\mu\text{m}$ の範囲で使用されるが、好ましくは80~100  $\mu\text{m}$ 程度である。この透明PPシートの着色シート基材(着色POシート)との接触面には、好ましくは、着色POシートの場合と同様に、コロナ放電処理、プラズマ処理、易接着層の形成等の易接着性処理が施される。

【0043】上記の着色POシートと透明な軟質PPシートは、一般的には、ドライラミネーション法により接着剤によって積層される。ドライラミネーション法による代表的な接着剤としては、イソシアネートを硬化剤とする二液硬化型ポリウレタン樹脂やポリエステル樹脂が使用されるが、その他に、ゴム系樹脂やポリエステル樹脂等も使用される。また、溶融押し出し法(エクストルージョン法)や熱プレスによる熱融着法等によりラミネートすることもできる。装飾処理が着色POシートに設けられた場合は、表面の透明PPシート側から接着層を通して装飾層が見える必要があり、接着層に透明性が要求される。しかし、装飾処理が透明な軟質PPシートの裏面に設けられた場合は、接着層は透明でも、不透明でもどちらでもよい。

【0044】エンボス加工は、従来公知のエンボス加工法がすべて利用できるが、例えば、通常の熱プレス方式の枚葉又は輪転式エンボス機が用いられる。また、印刷した着色POシートと透明PPシートを熱ラミネートするときに、エンボス版を用いて同時に表面の透明PPシートにエンボス加工を施す、所謂ダブリングエンボス方式により凹凸を形成することもできる。エンボス凹部の深さは、エンボスによって表現される模様等によって異なるが、化粧シート表面に良好な凹凸感を表現するには、30~80  $\mu\text{m}$ 程度が好ましい。

【0045】エンボス模様は木目の導管溝、浮造木目板の年輪凹凸等の木材表面のテクスチャーを表現したもの、塗装板の艶状態を再現したもの、又はそれらを組み合わせたもの、その他、ヘアライン、砂地、梨地、抽象パターンや、御影石板等の石材板表面のテクスチャーを表現する石目パターン、布帛の表面テクスチャーを表現する布目パターン、皮革面のテクスチャーを表現する皮紋パターン等を用いることができる。

【0046】前記エンボス凹部に充填されるワイピングインキとして使用される着色インキは、ウレタン樹脂、アクリル樹脂、ポリエステル樹脂、その他常用のインキのビヒクルに、通常の顔料、染料等の着色剤、体質顔料、硬化剤、添加剤、溶剤等からなるインキの中から、用途に応じて選定されるが、二液硬化型のインキが密着性、耐溶剤性の点で好ましい。また、ワイピング法は、ドクターブレード法、ロールコート法等、従来から使用されている公知のワイピング法のいずれによってもよい。

【0047】本発明に使用する帯電防止剤は、これを樹脂に使用する際の選択基準として以下のようなことが考慮される。①帯電防止能に持続性があること、②成形加工温度(140~350℃)で安定であること、③樹脂の熱分解を助長しないこと、④樹脂と適度に相溶し、成形後しみ出しが少ないこと、⑤少量(0.1~3.0 PPHR)で効果があること、⑥毒性が少なく、安価であること、⑦耐水性であること、⑧その他印刷性、接着性等の性能を損なわないこと等であり、その他必要に応じて、色調、透明性等も考慮する。代表的な帯電防止剤としては、界面活性剤、導電性物質(固体)の箔粉からなる導電性充填剤がある。

【0048】通常、界面活性剤の場合、水溶性の帯電防止剤が多く、そのため水洗すると表面の帯電防止剤が消失するが、時間の経過とともに再び表面にしみ出すので、持続性のある防止能が得られる。このしみ出し性は帯電防止剤とプラスチックとの相溶性、及びプラスチックのガラス転移温度(Tg)に最も大きく影響される。相溶性が良好であれば、表面へのしみ出しが少なく、均一に分散するため、帯電防止能が現れる濃度に達しにくい。

【0049】一方、相溶性が悪い場合は、表面へのベタツキ及び粉吹き現象を引起すことになる。また、極端に相溶性の悪い場合は練り込みが不可能となる。従って、帯電防止剤とプラスチックとの適度な相溶性が帯電防止能の決め手となる。この相溶性のバランスは、一般に溶解パラメータ(SP値)を用いて予測されている。即ち、SP値の近いもの同士は相互に溶解し、SP値の差の大きいものほど互いの溶解性は低下すると考えられ、一応の目安として使用している。

【0050】表面へのしみ出し速度はプラスチックのTgを境に大きく変化する。Tgが室温より低いポリオレフィンやフッ素系樹脂の場合、ポリマー分子は室温でもセグメントが熱運動をしており、この運動によって帯電防止剤の表面への移行は容易になる。一方、Tgが室温より高い硬質ポリ塩化ビニル、ポリスチレン、ポリメチルメタクリレート、ポリカーボネート、ポリエステル、ABS樹脂等は室温においてセグメント運動は凍結されており、帯電防止剤の表面への移行は非常に困難である。前者の場合、表面洗浄、摩擦等により帯電防止剤が

消失しても短時間に帯電防止能が回復するが、後者の場合、帯電防止剤が除去されると内部からのしみ出しが殆どなく帯電防止能の回復は期待できない。

【0051】帯電防止剤（界面活性剤）は、図10に示すように、アニオン系、カチオン系、非イオン系、両性系に分類される。その中でもカチオン系帯電防止剤は最も有効なものであるが、ポリ塩化ビニルの分解を促進するので、その使用には注意を要する。非イオン系帯電防止剤はカチオン系に比して効果が劣り、同等の効果を得るには2倍近く用いなければならないが、問題が少ないので多用される。しかし、使用量が多い場合には物性の低下とともに表面へのしみ出しがひどく、二次汚染を生じることがあるので注意を要する。内部用帯電防止剤はプラスチックの種類、他の配合剤の種類、成形方法（射出成形、押出し成形、ブロー成形、真空成形、カレンダー加工等）、及び成形条件等によっても効果が異なるので、使用にあたっては帯電防止剤の種類及び量の選択が重要である。

【0052】また、導電性充填剤としては、アルミニウム、ニッケル、銀、銅等の金属、ITO（酸化インジウム錫）、黒鉛等の物質からなり、形状は、鱗片状、箔片、略球状粒子、或いは短繊維等である。但し、これらの導電性充填剤は、一般に着色しており、透明性も低いいため、成形物の外観意匠を問題にする場合は、その点を考慮して選択する必要がある。

【0053】本発明の帯電防止性化粧シートは、他の被着体（裏打材）に積層することもできる。被着体としては各種素材の平板、曲面板等の板材、シート（或いはフィルム）、或いは各種立体形状物品（成形品）が対象となる。本発明の帯電防止性化粧シートは、各種被着体に積層し、所定の成形加工等を施して、各種の用途に使用される。例えば、壁、天井、床等の建築物の内装、浴室、洗面所、厨房等で用いる住設機器、窓枠、扉、手すり等の建具の表面化粧、机、食卓、筆筒等の家具又は弱電・OA機器のキャビネットの表面化粧、自動車、電車等の車両の内装、航空機の内装、窓硝子の化粧等に利用できる。そのために、帯電防止性化粧シートが直接素材等に接着できない場合は、適当な易接着層又は接着剤層を介して被着体に接着する。しかし、帯電防止性化粧シートが熱融着等で被着体に接着可能な場合は、易接着層又は接着剤層は省略してもよい。

【0054】被着体として、板材或いはシート（フィルム）のいずれにも用いられる素材としては、木材単板、木材合板、パーティクルボード、中密度繊維板（MDF）等の木材板、木質繊維板等の水質板、鉄、アルミニウム等の金属、アクリル、ポリカーボネート、エチレン・酢酸ビニル共重合体、エチレンビニルアセテート、ポリエステル、ポリスチレン、ポリオレフィン、ABS、フェノール樹脂、ポリ塩化ビニル、セルロース系樹脂、ゴム等の樹脂が挙げられる。被着体として専ら板材、或

いは立体形状物品として用いられる素材としては、ガラス、陶磁器等のセラミックス、ALC（発砲軽量コンクリート）等のセメント、珪酸カルシウム、石膏等の被セメント窯業系材料が挙げられる。被着体として専らシート（或いはフィルム）として用いられる素材としては、上質紙、和紙等の紙、炭素、石棉、チタン酸カリウム、ガラス、合成樹脂等の繊維からなる不織布又は織布等が挙げられる。

【0055】これら各種被着体への積層方法としては、例えば、次の①～⑤の方法を挙げることができる。即ち、

① 接着剤層を間に介して板状基材に加圧ローラーで加圧して積層する方法、

② 特公昭50-19132号公報、特公昭43-27488号公報等に記載されるように、化粧シートを射出成形の雌雄両金型間に挿入して、両金型を閉じ、雄型のゲートから熔融樹脂を射出充填した後、冷却して樹脂成形品の成形と同時にその表面に化粧シートを接着積層する、いわゆる射出成形同時ラミネート法、

③ 特公昭56-45768号公報、特公昭60-58014号公報等に記載されるように、化粧シートを成形品の表面に接着剤を介して対向しないは載置し、成形品側からの真空吸引による圧力差により化粧シートを成形品表面に積層する、いわゆる真空プレス積層方法、

④ 特公昭61-5895号公報、特公平3-2666号公報等に記載されるように、円柱、多角柱等の柱状基材の長軸方向に、化粧シートを間に接着剤層を介して供給しつつ、多数の向きの異なるローラーにより、柱状体を構成する複数の側面に順次化粧シートを加圧接着して積層してゆく、いわゆるラッピング加工方法、

⑤ 実公大15-31122号公報、特開昭48-47972号公報等に記載されるように、先ず化粧シートを板状基材に接着剤層を介して積層し、次いで板状基材の化粧シートとは反対側の面に、化粧シートと板状基材との界面に到達する、断面がV字状、又はU字状溝を切削し、次いで該溝内に接着剤を塗布した上で、該溝を折り曲げ、箱体又は柱状体を成形するいわゆる、Vカット又はUカット加工方法等が挙げられる。

【0056】特に、本発明の帯電防止性化粧シートを凹凸立体物に貼り合わせる方法としては、前記方法の中で、ラッピング加工法、Vカット加工法、射出成形同時ラミネート法、真空成形同時ラミネート法等が好ましい。

【0057】

【実施例】以下に、実施例に基づいて本発明を更に詳細に説明する。

（実施例1）図7（a）に示すように、着色シート基材11として、坪量30g/m<sup>2</sup>の紙間強化紙（三興製紙（株）製「FIX30」）を使用し、これに、塩化ビニル・酢酸ビニル共重合体とアクリル系樹脂からなるイン



キ(昭和インク工業(株)製)を用いてグラビア印刷し、図7(a)に示すように、装飾層12を形成して印刷着色シートを作製した。一方、ポリオレフィン系樹脂(住友化学(株)製「VL200」)にアルキルアミン誘導体を主成分とする界面活性剤(松本油脂製薬(株)製「TB-104」)を0.7重量%添加した樹脂を用いて、押し出し機にてTダイ法によりシートを作製して、図7(b)に示すように、厚さ500 $\mu$ mの界面活性剤14aを含有する透明POシート13を得た。

【0058】次に、図7(c)に示すように、上記着色シート基材11の装飾層12側と透明POシート13をウレタン系接着剤16を用いて積層し、帯電防止性化粧シート1を作製した。この帯電防止性化粧シート1の表面抵抗値は $5 \times 10^{11} \Omega$ であった。そのため、上記帯電防止性化粧シート1を用いて、グラビア印刷機にて透明保護層を印刷した場合、約800Vにしか帯電しなかった。

【0059】(実施例2)着色POシート11aとして、厚さ100 $\mu$ mの着色ポリオレフィン系樹脂シート(タツノ化学(株)製「タフバー」)を使用し、これにウレタン系インキ(昭和インク工業(株)製)を用いてグラビア印刷して装飾層12を形成し、図8(a)に示すように、印刷着色POシートを作製した。その着色POシート11aの装飾層12側に、界面活性剤(花王(株)製「エレクトロストリッパーTS」)を0.3重量%添加したポリオレフィン系樹脂(出光石油化学(株)製「E-940」)を、押し出し機にてTダイ法により押し出しラミネートし、図8(b)に示すように、表面に界面活性剤を含有する透明POシートを有する積層シートを作製した。更に、木目導管のエンボス模様を形成したエンボスロールを用いて、上記積層シートを加熱、加圧して、図8(c)に示すように、積層シートの透明POシート13側にエンボス模様15を形成して、エンボス模様15を有する帯電防止性化粧シート1を作製した。この帯電防止性化粧シートの表面抵抗値は $3 \times 10^{11} \Omega$ であった。

【0060】(実施例3)着色シート基材として、高密度ポリエチレンをベースにして、これに熱可塑性エラストマー、無機充填剤、着色顔料等を添加した樹脂混合物に、実施例2で用いた界面活性剤を0.5重量%添加し、これを押し出し機にてTダイ法により押し出し、図9(a)に示すように、厚さ200 $\mu$ mの着色POシート11aを作製した。この界面活性剤14aを含有した着色POシート11aに、コロナ放電処理を施した後、ウレタン系インキ(昭和インク工業(株)製)を用いてグラビア印刷して装飾層12を形成し、図9(b)に示

すように、印刷着色POシートを作製した。

【0061】一方、実施例2と同様に、ポリオレフィン系樹脂に界面活性剤を0.7重量%添加した樹脂を用いて、厚さ100 $\mu$ mの界面活性剤14aを含有する透明POシート13を作製した。次に、図9(d)に示すように、上記着色POシート11aと透明POシート13をウレタン系接着剤を用いて積層し、着色POシート11aと透明POシート13の両方に界面活性剤を含有する帯電防止性化粧シート1を作製した。この帯電防止性化粧シート1の表面抵抗値は $5 \times 10^{11} \Omega$ であった。

【0062】(比較例1)透明POシートに帯電防止剤を添加しない以外は、実施例1と同様に化粧シートを作製して比較例1とした。

(比較例2)透明POシートに帯電防止剤を添加しない以外は、実施例2と同様に化粧シートを作製して比較例2とした。

【0063】(帯電防止性能試験)実施例1、2、3及び比較例1、2で作製した化粧シートについて、表面抵抗値及びゴミの付着量を測定した。表面抵抗はJIS-K-6911に準拠して測定し、ゴミの付着量は、各実施例及び各比較例で作製した化粧シートを5cm $\times$ 5cmの寸法に裁断して試験片とし、各試験片の透明POシート13(実施例の場合、帯電防止剤を含有する透明POシートを示す)側を、紙((株)クレシヤ製造のJKワイパー(商標))にて10往復擦り、煙草の灰を一面に敷き詰めたガラス板表面に、各試験片の透明POシート13側を漸次接近させ、灰の付着状況を目視で観察した。試験は20 $^{\circ}$ C、60%RHの雰囲気で行った。また、実施例1、2、3及び比較例1、2で作製した化粧シートの巻き取りを用いて、グラビア印刷機にて化粧シートの透明POシート側にオーバープリントコートを行う際に、ウェットに発生した帯電電圧を測定した。

【0064】(試験結果)結果は表2に示すとおりで、実施例で作製した帯電防止性化粧シートはいずれも帯電防止効果が優れており、作業工程中のトラブルもなく、また、ゴミの付着量も少なかった。従って、本発明の帯電防止性化粧シートは、ウェット状態でグラビア印刷する場合、帯電防止効果により、帯電電圧が少なくなり、印刷工程中にスパークする恐れがなく、高速で印刷することができた。また、ゴミの付着量が少なく、且つ付着したゴミも容易に取り除くことができることから、ゴミの付着に起因する不良品の発生を殆どなくすることができた。

【0065】

【表2】

帯電防止性能試験結果			
試料	表面抵抗 [Ω]	ゴミの付着状態	印刷中のウェッ プの帯電状態
実施例1の試料 実施例2の試料 実施例3の試料	$1 \times 10^{11}$ $3 \times 10^{13}$ $2 \times 10^{11}$	いずれも、灰と化粧シ ートとの距離を0cmに近 づけても灰の付着なし	帯電0.8Vで、ス パークの恐れな し、印刷続行
比較例1の試料 比較例2の試料	$1 \times 10^{18}$ $2 \times 10^{18}$	いずれも、距離10cm の段階で化粧シートの全 面に灰が付着	帯電40kVで、ス パークの恐れあ り、印刷中断

【0066】

【発明の効果】本発明の帯電防止性化粧シートは、表面抵抗が少なく、且つウェッブによる印刷工程中においても帯電電圧が小さいため、ワイピング加工やオーバープリント等の後工程において、静電気による火災の発生の恐れがなくなり、作業能率が向上する。また、本発明の帯電防止性化粧シートは、プラスチック、紙、木材、金属板、無機系素材等あらゆる基材に貼付することにより、その表面に帯電防止性能を付与することができるので、衛生的な環境を必要とする場所で使用される各種備品（電気製品、キャビネット、各種器具等）に対し、帯電防止性能を付与するには非常に有効な手段である。例えば、本発明の帯電防止性化粧シートを用いて化粧鋼板を作製し、この化粧鋼板を、病院の間仕切り、衝立、手摺等に利用した場合は、ゴミの付着量を少なくすることができると共に、拭き取り等で容易に付着したゴミを除去することができるので、何時も清潔な状態を維持することができる。更に、着色ポリオレフィン系樹脂よりなる基材シートに、無色又は着色透明な軟質ポリプロピレン系樹脂よりなる表面シートを積層した本発明の帯電防止性化粧シートは、これを被着体に積層し、該化粧材にVカット加工を施しても、表面シートに亀裂が生じたり、白化したりする虞れがなくなる。

【図面の簡単な説明】

【図1】本発明の帯電防止性化粧シートの一例を示した模式断面図である。

【図2】本発明の別の態様で、表面の透明樹脂シートと着色シート基材の両方に帯電防止剤を含有する帯電防止性化粧シートの模式断面図である。

【図3】本発明の更に別の態様で、帯電防止剤を含有す

る透明な樹脂シートにエンボス模様を形成した帯電防止性化粧シートの模式断面図である。

【図4】帯電防止剤を含有する透明な樹脂シートと着色シート基材を、接着剤を介して積層したときの帯電防止性化粧シートの模式断面図である。

【図5】透明な樹脂シートと着色シート基材の両方に帯電防止剤を含有させて、この両方のシートを接着剤を介して積層したときの帯電防止性化粧シートの模式断面図である。

【図6】本発明の帯電防止性化粧シートを作製するときの説明図である。

【図7】実施例1により帯電防止性化粧シートを作製するときの説明図である。

【図8】実施例2により帯電防止性化粧シートを作製するときの説明図である。

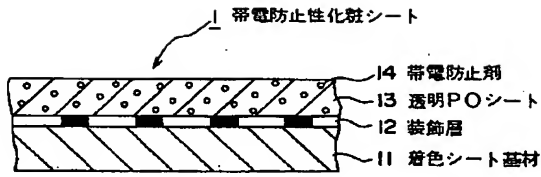
【図9】実施例3により帯電防止性化粧シートを作製するときの説明図である。

【図10】界面活性剤をアニオン系、カチオン系、非イオン系、両性系に分類した表である。

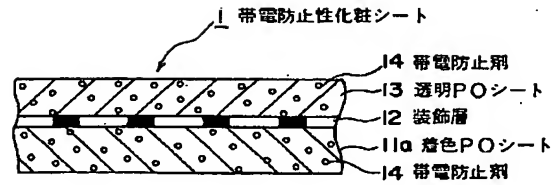
【符号の説明】

- 1 帯電防止性化粧シート
- 11 着色シート基材
- 11a 着色POシート
- 12 装飾層
- 13 透明POシート
- 14 帯電防止剤
- 14a 界面活性剤
- 15 エンボス模様
- 16 接着剤層

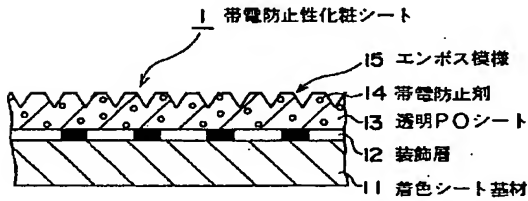
【図1】



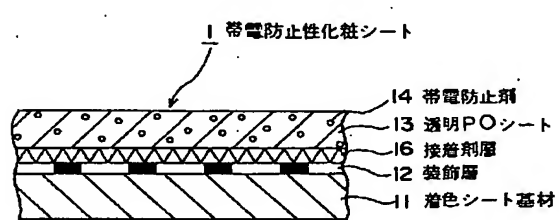
【図2】



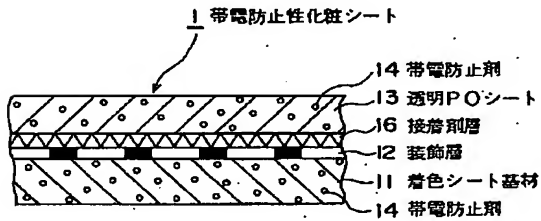
【図3】



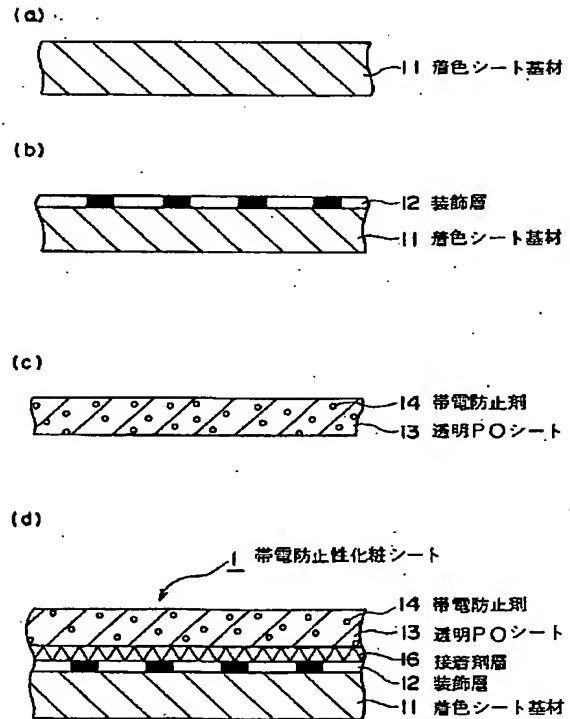
【図4】



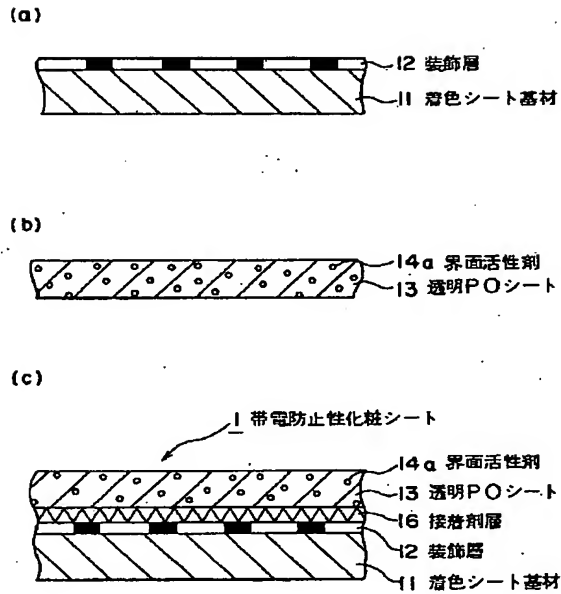
【図5】



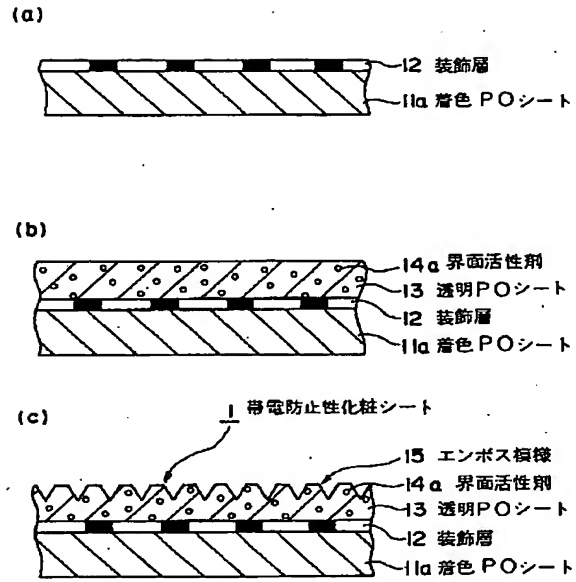
【図6】



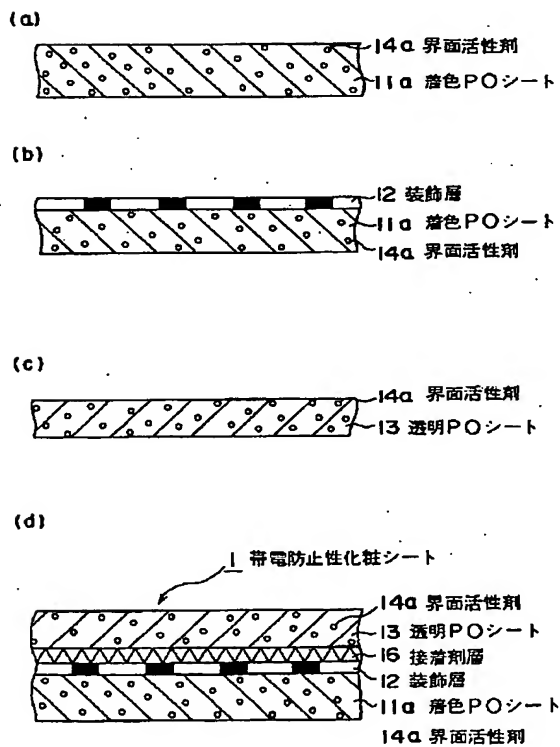
【図7】



【図8】



【図9】



【図10】

## 帯電防止剤（界面活性剤）

種 類	型	例および構造式 <sup>a)</sup>
アニオン系	アルキルサルフェート型	$R_{12}O(C_2H_4O)_n-SO_3N(-C_2H_4OH)_3$ $R_{16}OSO_3NHC(=NH)-NHCONH_2$
	アルキルアリルサルフェート型	$R_9-\text{C}_6\text{H}_4-O(C_2H_4O)_n-SO_3N(-C_2H_4OH)_2$
	アルキルホスフェート型	$RO-\text{P}(=O)(RO)-O(C_2H_4O)_n-N(-C_2H_4OH)_2$
	アルキルアミンサルフェート型	$R_{16}NHC_2H_4OSO_2N(C_2H_4OH)_2$ $R_{12}CONHC_2H_4OSO_3Na$
カチオン系 <sup>b)</sup>	第四級アンモニウム塩型	$[R_{17}CONHC_3H_8N(CH_3)_2C_2H_4OH]^+X^-$ $X: NO_3, ClO_4$
	第四級アンモニウム樹脂型	$-CH_2-CH-$ $ $ $CONH-R-NX-(CH_3)_2^+Y^-$
	イミダゾリン型	$R_{17}-C \begin{array}{l} \nearrow N-CH_2 \\ \searrow N-CH-CH_2COOH \\   \\ H^+ \end{array} CH_2-CH_2OH$ $Y^-$
非イオン系 <sup>c)</sup>	ソルビタン型 エーテル型 アミンおよびアミド型 エタノールアミド型	ポリオキシエチレンソルビタンモノステアレート ポリオキシエチレンアルキルおよびアリルエーテル ポリオキシエチレンアルキルアミンおよびアミド $R_{17}CONH(C_2H_4O)_3H$
両性系	ベタイン型	$R_{16}-N^+(CH_3)_2-CH_2COO^-$ $R_{12}-N^+[-(CH_2CH_2O)_nH]_2-CH_2CH_2PO_3^{--}Na^+$

注 a) ここでRは炭素数任意の脂肪族炭化水素基を、例えばR<sub>12</sub>は炭素数12の脂肪族炭化水素基をさす。市販品には種類を表示しているが、化学構造を明らかにしていないものが多い。添加量は0.2～2部、硬質プラスチックに速効かつ効果的な防止剤はほとんどない。

b) カチオン系は効果が大きいので最もよく使われる。ただしPVCの場合は樹脂の熱分解と着色を促進するのでレコードを除いてあまり使われない。

c) ソルビタン型、エーテル型には着色の問題がないが、効果が小さいので添加量をやや多くする。

# PATENT ABSTRACTS OF JAPAN

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// C09K 3/16

(21)Application number : 09-074696

(71)Applicant : DAINIPPON PRINTING CO LTD

(22)Date of filing : 12.03.1997

(72)Inventor : SHIBATA MASAYUKI  
NISHIO TOSHIKAZU

## (54) ANTISTATIC DECORATIVE SHEET

(57)Abstract:

**PROBLEM TO BE SOLVED:** To lessen the surface resistance of a decorative sheet and to prevent occurrence of fire due to a spark of static electricity and also sticking of dust by forming a resin layer containing an antistatic agent on the surface of the decorative sheet.

**SOLUTION:** A colored sheet base 11 is prepared by an extrusion method or the like by using polyolefin resin blended with a coloring agent, an inorganic filler, etc., and a decorative layer 12 is provided on this colored sheet base 11 by printing or the like. Then, an antistatic decorative sheet 1 is manufactured by laminating a transparent PO sheet 13 containing an antistatic agent 14 such as surfactant in the percentage of 0.1-1wt.% on the decorative layer 12 side of the colored sheet base 11.



## LEGAL STATUS

[Date of request for examination]

[Date of sending the examiner's decision of rejection]

[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]

[Date of final disposal for application]

[Patent number]

[Date of registration]

[Number of appeal against examiner's decision of rejection]

[Date of requesting appeal against examiner's



decision of rejection]

[Date of extinction of right]

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**CLAIMS**

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[Claim(s)]

[Claim 1] An antistatic nature makeup sheet which this transparence resin layer consists of olefin system resin, and contains an antistatic agent 0.1 to 1% of the weight in a makeup sheet which carried out the laminating of a coloring sheet base material, an ornament layer, and the transparence resin layer, and is characterized by a surface-electrical-resistance value of this makeup sheet being 10<sup>14</sup>ohms or less.

[Claim 2] An antistatic nature makeup sheet according to claim 1 characterized by for said coloring sheet base material consisting of olefin system resin, and containing a coloring agent and an antistatic agent at least.

[Claim 3] Claim 1 to which said antistatic agent is a surfactant and this surfactant is characterized by having said olefin system resin and moderate compatibility, and having a property which can move in the inside of olefin system resin, and an antistatic nature makeup sheet according to claim 2.

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**DETAILED DESCRIPTION**

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[Detailed Description of the Invention]

[0001]

[The technical field to which invention belongs] This invention relates to a makeup sheet available as a surface makeup sheet used for the interior of a building, surface makeup of fittings, vehicles interior, etc.

[0002]

[Description of the Prior Art] Conventionally, the makeup sheet which prepared the surface resin layer which consists of thermoplastics in the surface of a base material sheet is well-known. For example, the makeup sheet which carried out the melting knockout of the thermoplastics, such as vinyl chloride system resin or polyolefine system resin, to the surface of porous base materials, such as paper which printed the pattern of arbitration, and a nonwoven fabric, and laminated it on it is indicated by JP,51-34967,A.

[0003] Moreover, the makeup sheet which used polyolefine system sheets, such as polyethylene and polypropylene, is proposed in recent years as what is replaced with vinyl chloride resin (refer to JP,54-62255,A). On for example, the surface of the sheet base material which consists of polyolefine system resin which has concealment nature The laminating of a pattern printing layer, an adhesives layer, and the thermoplastic transparence elastomer film is carried out one by one. The embossing makeup sheet (JP,6-79830,A) which performed embossing to a laminating and coincidence and prepared the embossing pattern in the surface, A pattern layer is prepared in the sheet base material which consists of polyolefine system resin which has concealment nature. While the transparence resin of a polyolefine system is extruded and laminated in this, an embossing crevice is prepared by embossing, and the makeup sheet (JP,6-79850,A) which filled up this embossing crevice with coloring ink by wiping processing is proposed. Furthermore, the thing (JP,6-21080,A, JP,4-504384,A) which made the polyolefine system resin to which the graft polymerization of the polar functional group was carried out mix thermoplastic elastomer olefin, or the thing (JP,7-26038,A) which the compatibilizer was used [ thing ] for polyolefine system resin and mixed polyurethane resin is proposed as amelioration specification of said polyolefine system resin sheet.

[0004]

[Problem(s) to be Solved by the Invention] However, dust and dust tend to adhere that static electricity tends to generate the makeup sheet which used a polyvinyl chloride and polyolefine system resin. Since surface electrical resistance is large, it may be easy to be charged, and static electricity may occur in an after [ wiping processing, an overprint coat (it considers as OP coat below), etc. ] production process, and especially the makeup sheet that used polyolefine system resin may cause an outbreak of a fire by the spark of the static electricity. Moreover, the electrified makeup sheet causes generating of a defective while dust and dust become easy to adhere and a sanitary problem arises. Usually, existing independently does not almost have microorganisms, such as bacteria in air, and mold, and since it adheres and exists in dust or dust in many cases, as for the conventional makeup sheet which is easy to be charged, bacteria, mold, etc. become is easy to be polluted.

[0005] It prevents adhesion of dust and dust while this invention forms the resin layer containing an antistatic agent in the surface of a makeup sheet, decreases the surface electrical resistance of a makeup sheet and prevents the outbreak of a fire by the spark of static electricity, in order to solve these problems. Furthermore, since wiping, rinsing, etc. can remove adhering dust and the adhering dust easily, the surface of a makeup sheet can maintain a clean condition over a long period of time.

[0006]

[Means for Solving the Problem] In order to solve the above-mentioned problem, a configuration of a

makeup sheet was made to be the following. In a makeup sheet which carried out the laminating of a coloring sheet base material, an ornament layer, and the transparence resin layer, this transparence resin layer consisted of olefin system resin, and an antistatic agent was contained 0.1 to 1% of the weight, and it considered as an antistatic nature makeup sheet characterized by a surface-electrical-resistance value of this makeup sheet being 1014ohms or less. Moreover, said coloring sheet base material consisted of olefin system resin, and considered as an antistatic nature makeup sheet containing a coloring agent and an antistatic agent at least. Furthermore, using a surfactant as said antistatic agent, this surfactant has said olefin system resin and moderate compatibility, and selected what has a property which can move in the inside of olefin system resin.

[0007] That is, as a resin layer of the surface of a makeup sheet is formed using transparent olefin system resin which contains an antistatic agent 0.1 to 1% of the weight and a surface-electrical-resistance value of the makeup sheet surface is set to 1014ohms or less, it considers as a makeup sheet which has antistatic engine performance. Moreover, a makeup sheet is produced using olefin system resin which contains an antistatic agent not only in the surface of a makeup sheet but in a coloring sheet base material, and it considers as a makeup sheet which has antistatic engine performance. And a surfactant kneaded by olefin system resin carries out bleed out to the makeup sheet surface, and enables it to prevent electrification of the surface by selecting a surfactant which has olefin system resin and moderate compatibility as an antistatic agent, and has a property which can move freely in the inside of olefin system resin.

[0008]

[Embodiment of the Invention] Below, this invention is explained at details, making a drawing reference. Drawing 1 is type section drawing having shown an example of the antistatic nature makeup sheet of this invention. Drawing 2 is another mode of the antistatic nature makeup sheet of this invention, and is type section drawing of a resin sheet with the transparent surface, and the antistatic nature makeup sheet which contains an antistatic agent in both coloring sheet base materials. Drawing 3 is still more nearly another mode of the antistatic nature makeup sheet of this invention, and is type section drawing of the antistatic nature makeup sheet which formed the embossing pattern in the transparent resin sheet containing an antistatic agent. Drawing 4 is type section drawing of the antistatic nature makeup sheet when carrying out the laminating of the transparent resin sheet and transparent coloring sheet base material containing an antistatic agent through adhesives. Drawing 5 is type section drawing of the antistatic nature makeup sheet when making both a transparent resin sheet and a coloring sheet base material contain an antistatic agent, and carrying out the laminating of the sheet of these both through adhesives. Drawing 6 is explanatory drawing having shown an example when producing the antistatic nature makeup sheet of this invention. Drawing 7 is explanatory drawing when producing the antistatic nature makeup sheet of this invention according to an example 1. Drawing 8 is explanatory drawing when producing the antistatic nature makeup sheet of this invention according to an example 2. Drawing 9 is explanatory drawing when producing the antistatic nature makeup sheet of this invention according to an example 3. Drawing 10 is the table which classified the surfactant into the anion system, the cation system, the non-ion system, and the both-sexes system.

[0009] The makeup sheet (it only considers as an antistatic nature makeup sheet below) 1 which has the antistatic engine performance of this invention consists of a coloring sheet base material 11, an ornament layer 12, and a transparent polyolefine system resin sheet (it considers as a transparence PO sheet below) 13 containing an antistatic agent 14, as shown in drawing 1. Moreover, as shown in drawing 2, it may consider as the antistatic nature makeup sheet 1 which consists of transparence PO sheets 13 which contain colored polyolefine system resin sheet (it considers as coloring PO sheet below) 11a containing an antistatic agent 14, the ornament layer 12, and an antistatic agent 14 as what contained the antistatic agent also in the coloring sheet base material. Furthermore, as shown in drawing 3, the embossing pattern 15 may be formed in the transparence PO sheet containing an antistatic agent 14, and it may consider as the antistatic nature makeup sheet 1.

[0010] Moreover, as shown in drawing 4, it may consist of the coloring sheet base material 11, an ornament layer 12, an adhesives layer 15, and a transparence PO sheet 13 containing an antistatic agent 14 as specification which laminates a coloring sheet base material and the transparence PO sheet containing an antistatic agent using adhesives. Furthermore, it may consist of the coloring sheet base material 11 using adhesives which contained the antistatic agent 14 as shown in drawing 5 as specification,

an ornament layer 12, an adhesives layer 15, and a transparence PO sheet 13 containing an antistatic agent 14.

[0011] Below, the manufacture method of the antistatic nature makeup sheet of this invention is explained. First, as shown in drawing 6 (a), a coloring sheet is produced by the extruding method, the calender method, etc. as a coloring sheet base material 11 using the thermoplastics which blended the coloring agent, the inorganic bulking agent, etc. Subsequently, as a grain handle etc. is printed to this coloring sheet base material 11 by gravure etc. and it is shown in it at drawing 6 (b), the ornament layer 12 is formed. On the other hand, as shown in drawing 6 (c), an antistatic agent 14 is added in 0.1 – 1% of the weight of the range to polyolefine system resin, such as polyethylene and polypropylene, it sheet-izes by an extruding method etc. using the polyolefine system resin containing this antistatic agent, and the transparence PO sheet 13 containing an antistatic agent 14 is produced. Next, as shown in drawing 4 (d), the coloring sheet base material 11 which formed said ornament layer 12, and the transparence PO sheet 13 containing an antistatic agent 14 are stuck with a dry lamination process etc. through the adhesives layer 16, and the antistatic nature makeup sheet 1 is produced.

[0012] Moreover, after producing like the above the coloring sheet base material 11 which formed the ornament layer 12, and the transparence PO sheet 13 containing an antistatic agent 14, as the laminating of these both sheet is carried out and it is shown in drawing 3 by the doubling embossing method using an embossing roll, the antistatic nature makeup sheet 1 in which the embossing pattern was formed on the surface is also producible.

[0013] Furthermore, as another mode of this invention, using the polyolefine system resin which added the antistatic agent and the coloring agent, coloring PO sheet 11a is produced, and as mentioned above, by an extruding method etc., as shown in drawing 6 (a), as shown in drawing 6 (b), the ornament layer 12 is formed in coloring PO sheet base material 11a containing this antistatic agent. In the ornament layer 12 side of this coloring PO sheet 11a, the melting knockout of the polyolefine system resin containing an antistatic agent 14 can be carried out, it can be laminated, and an antistatic nature makeup sheet as shown in drawing 2 can also be produced. Moreover, after producing separately the transparence PO sheet 13 containing coloring PO sheet 11a containing an antistatic agent 14, and an antistatic agent 14 and forming the ornament layer 12 in coloring PO sheet 11a, the laminating of these both sheet can be carried out through the adhesives layer 16, and the antistatic nature makeup sheet 1 as shown in drawing 5 can also be produced.

[0014] As for the coloring sheet base material in this invention, fiber sheets, such as a polyolefine system resin sheet, a film (a film shall also be included when calling it a sheet in this invention below), or paper, are used. As resin of a polyolefine system resin sheet, polyethylene (it considers as Following PE), polypropylene PIRENN (it considers as Following PP), ethylene propylene rubber, an ethylene butene-1 copolymer, a propylene butene-1 copolymer, polybutene 1, the 3 yuan copolymer of butene-1 propylene ethylene, the 3 yuan copolymer of butene-1 hexene 1 and octene 1, the poly methyl pentene, polyolefine system thermoplastic elastomer, etc. are mentioned. These resin may be independent or may be mixed two or more sorts.

[0015] In this invention, the coloring agent which becomes the above-mentioned polyolefine system resin from a pigment or a color is blended, a sheet is produced by extruding etc. using this coloring resin, and it is used as a coloring sheet. The thickness of a sheet excels [ micrometers / about 50–500 ] in the direction of a non-extended sheet in respect of shaping fitness etc. in post processing of a makeup sheet, such as V cut processing, although both an extension sheet and a non-extended sheet are usable. coloring of a sheet — a use — responding — transparence coloring and opacity (concealment) coloring — although either is usable, it is necessary to conceal the surface of adherend and, generally opaque coloring is desirable.

[0016] Moreover, to a coloring sheet base material, extenders (bulking agent), such as a calcium carbonate, an alumina (aluminum oxide), and a barium sulfate, or a foaming agent, a flame retarder, a thermostabilizer, an ultraviolet ray absorbent, etc. may be added if needed. As the above-mentioned coloring agent, the pearly luster pigment which consists of \*\*\*\*, such as metal pigments, such as organic pigments, such as inorganic pigment [, such as a titanium white, a zinc white, rouge, a vermilion, ultramarine blue, cobalt blue, Titanium Yellow, and carbon black, ], isoindolinone, Hansa yellow A, Quinacridone, and Permanent Red 4R and copper phthalocyanine blue, or a color, aluminum, and brass, a titanium-dioxide covering mica, and basic zinc carbonate, is used.

[0017] Although the above-mentioned polyolefine system resin is used also in itself, in order to give flexibility, shock resistance, and easy adhesiveness to polyolefin resin, it may add various rubber preferably. As rubber, although it is diene system rubber, hydrogenation rubber, a polyolefine system elastomer, etc., hydrogenation diene system rubber is desirable especially.

[0018] Hydrogenation diene system rubber makes it come to a part of double bond [ at least ] of a diene system rubber molecule to add a hydrogen atom, is used as a modifier of polyolefine system resin, suppresses crystallization of polyolefine system resin, and has the role which makes flexibility and transparency raise. Generally, for the double bond of diene system rubber, if diene system rubber is added to polyolefine system resin, although weatherability and thermal resistance fall from additive-free polyolefine system resin, in order to saturate the double bond of diene system rubber with hydrogenation, they will not have the weatherability of polyolefine system resin, and a heat-resistant fall, either, and will become good by this invention.

[0019] As the above-mentioned diene system rubber, there are polyisoprene rubber, butadiene rubber, isobutylene isoprene rubber, propylene butadiene rubber, acrylonitrile-butadiene rubber, acrylonitrile polyisoprene rubber, styrene-butadiene rubber, etc. From the purpose of this invention, styrene-butadiene rubber is desirable. As an addition, 1 – 90 weight section degree is good to the polyolefine system resin 100 weight section. If an addition is under 1 weight section, the elasticity by rubber addition, a pace of expansion, and shock resistance run short, in the case of bending processings, such as V cut processing and spinning, it will become easy to produce a crack and a crack and the addition effect of diene system rubber will not show up. Moreover, if an addition exceeds 90 weight sections, elasticity and a pace of expansion become [ become large too much and / aim doubling at the time of printing ] difficult and are not desirable.

[0020] It is the elastic copolymer which added two kinds or three sorts or more of olefins, and at least one sort of polyenes which may be copolymerized as a polyolefine system elastomer, and ethylene, a propylene, an alpha olefin, etc. are used and, as for an olefin, 1, 4 hexadiene, annular diene, norbornene, etc. are used as a polyene. As a desirable olefin system copolymer, the elastic copolymer which uses olefins, such as ethylene propylene copolymer rubber, an ethylene propylene and nonconjugated diene rubber, and ethylene butadiene copolymer rubber, as a principal component is mentioned, for example. As an addition of a polyolefine system elastomer, it is about 30 % of the weight preferably ten to 60% of the weight in a base material. At less than 10 % of the weight, change of ductility becomes steep too much at the time of a fixed load, and ductility and a shock-proof fall arise at the time of a fracture. If an addition exceeds 60 % of the weight, transparency, weatherability, and creep resistance will fall.

[0021] Furthermore, the sheet with which a good better thing consists of high-density-polyethylene resin, a thermoplasticity nature elastomer, a coloring agent, and an inorganic bulking agent is mentioned as a base material sheet of this invention. If [ above-mentioned ] high density polyethylene RENTO is carried out, specific gravity is polyethylene of 0.94–0.96, it is manufactured by the low voltage method, and degree of crystallinity is high and the thing of the molecular structure with little branching is used for a molecule. Moreover, as the above-mentioned thermoplastic elastomer, diene system rubber, hydrogenation diene system rubber, a polyolefine system elastomer, etc. are used. As an addition of thermoplastic elastomer, it is about 30 % of the weight preferably ten to 60% of the weight in a base material. At less than 10 % of the weight, change of ductility becomes steep too much at the time of a fixed load, and ductility and a shock-proof fall arise at the time of a fracture. If an addition exceeds 60 % of the weight, transparency, weatherability, and creep resistance will fall.

[0022] As an inorganic bulking agent added to high density polyethylene, powder, such as a calcium carbonate, a barium sulfate, clay, and talc, is used. As an addition, it is about 30 % of the weight preferably five to 60% of the weight in a base material sheet. At less than 5 % of the weight, creep-proof deformans and easy adhesiveness fall, and if it exceeds 60 % of the weight, ductility and a shock-proof fall will arise at the time of a fracture. The same thing as the above is used as a coloring agent.

[0023] To said polyolefine system resin, a coloring agent, various rubber or a polyolefine system elastomer, an inorganic bulking agent, etc. are added, and it considers as resin mixture, and sheet-izes according to well-known methods, such as an extrusion process or the calender method, using this resin mixture, and an opaque coloring PO sheet is produced to it. Although the thickness of a coloring PO sheet is used in 50–500 micrometers, it is about 100–200 micrometers preferably.

[0024] In order to improve adhesive strength with printing ink, transparent PO sheet, and adhesives, easy



adhesiveness processing of formation of corona discharge treatment, plasma treatment, and an easy-bonding layer etc. is performed to the surface of the above-mentioned coloring PO sheet used for this invention. Although the coating liquid which dissolved resin, such as acrylic resin, urethane system resin, vinyl chloride vinyl acetate copolymer system resin, polyester resin, polyurethane resin, chlorinated polyethylene, and chlorination polypropylene, in the solvent is used as an easy-bonding layer (it is also called a primer layer or a support layer), the thing especially using polyurethane resin is desirable. It applies and dries by the well-known method, and let the coating liquid which dissolved the above-mentioned resin in the solvent be an easy-bonding layer.

[0025] As a fiber sheet used as a base material sheet, they are a basis weight 50 – 150 g/m<sup>2</sup>. The sheet which consists of paper, textile fabrics, or a nonwoven fabric is mentioned. The thickness can be chosen from the range of 50–300 micrometers according to a use. As fiber simple material which constitutes a fiber sheet, the fiber of an inorganic system which consists of the synthetic fiber of nature systems of organic, such as natural fibers, such as cellulose pulp, hemp, and cotton, nylon, polypropylene, and polyester, asbestos, glass, a quartz, carbon, potassium titanate, etc. is mentioned. In addition, the fiber base material sheet using cellulose pulp fiber is the so-called paper, and, specifically, paper of fine quality, kraft paper, Japanese paper, etc. are mentioned. When a base material sheet is a nature fiber sheet of organic, as a flame retarder, phosphoric-acid compounds, such as aluminum-hydroxide powder or aziridinyl phosphine oxide, etc. are mixed, and fireproofing is performed.

[0026] An ornament layer is formed in a coloring sheet base material of printing etc. at one side. As an ornament layer, there are a printing pattern by printing, an embossing pattern by embossing, and a concavo-convex pattern by hairline processing, the crevice of a concavo-convex pattern can be further filled up with coloring ink by the well-known wiping processing method, and an ornament layer can also be formed. As a printing pattern, there is a grain handle, a grain handle, a texture handle, a hide variegated pattern, a geometric figure, an alphabetic character, a mark, various abstract patterns, or whole surface solid printing. The concealment layer of whole surface solid printing may be omitted according to the surface state of the adherend which sticks a makeup sheet.

[0027] As ink of encaustic printing, although it changes with the quality of the materials and the gestalten of a printing base material (a coloring PO sheet or transparent PO sheet), generally, homopolymers, such as nitrocellulose, cellulose acetate, a vinyl chloride vinyl acetate copolymer, a polyvinyl butyral, urethane resin, acrylic resin, and polyester resin, or a polymer with other monomers is used as a vehicle, and the ink which consists of coloring agents, such as this, the usual pigment, and a color, an extender, a curing agent, an additive, a solvent, etc. is used. Especially, ink excellent in thermal resistance and weatherability is suitably selected by the makeup sheet of this invention according to a use.

[0028] As printing of a pattern, the usual printing methods, such as gravure, intaglio printing, offset printing, letterpress printing, flexographic printing, silk screen printing, electrostatic printing, and ink jet printing, can be used. Or a pattern pattern may once be independently formed on a mold-release characteristic sheet, an imprint sheet may be created, and encaustic printing may be imprinted and prepared with the decalcomania method from the obtained imprint sheet. Moreover, instead of a printing pattern, metals, such as aluminum, chromium, gold, silver, and copper, can be formed in a coloring sheet base material or transparent PO sheet, a metal thin film can be formed in the whole surface or a partial target by vacuum deposition, sputtering, etc., and it can also consider as an ornament layer.

[0029] As a transparent olefin system resin layer (transparence PO sheet) in this invention, what uses polyolefin resin as a principal component is used. As resin of a transparence PO sheet, polyethylene (it considers as Following PE), polypropylene PIRENN (it considers as Following PP), ethylene propylene rubber, an ethylene butene-1 copolymer, a propylene butene-1 copolymer, polybutene 1, butene-1 propylene ethylene the copolymer of 3 yuan, butene-1 hexene 1, and octene the copolymer of 13 yuan, the poly methyl pentene, polyolefine system thermoplastic elastomer, etc. are mentioned. These resin may be independent or may be mixed two or more sorts.

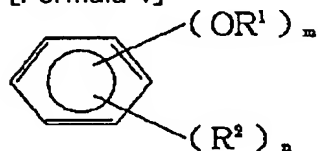
[0030] Although the above-mentioned polyolefine system resin is used also in itself, in order to give flexibility, shock resistance, and easy adhesiveness to polyolefin resin, it may add various rubber preferably. As rubber, although it is diene system rubber, hydrogenation rubber, an olefin elastomer, etc., hydrogenation diene rubber is desirable especially. Hydrogenation diene system rubber makes it come to a part of double bond [ at least ] of a diene system rubber molecule to add a hydrogen atom, and is used as a modifier of polyolefine system resin. Crystallization of olefine resin is suppressed and there is a role

which makes flexibility and transparency raise.

[0031] Generally, for the double bond of diene system rubber, if diene system rubber is added to polyolefine system resin, although weatherability and thermal resistance fall from additive-free polyolefine system resin, in order to saturate the double bond of diene system rubber with hydrogenation, they will not have the weatherability of polyolefine system resin, and a heat-resistant fall, either, and will become good by this invention. As the various rubber added to polyolefine system resin, and polyolefine system thermoplastic elastomer, the various above-mentioned rubber used for a coloring sheet base material and a polyolefine system elastomer can be used.

[0032] the colorlessness which has the composite construction which consists of mixed stock of atactic polypropylene and isotactic polypropylene as desirable resin of the transparence PO sheet in this invention, or coloring — transparent elasticity polypropylene resin is used. Atactic polypropylene can be manufactured by the well-known method (JP,63-243106,A). concrete — (\*\*) — the solid-state catalyst component which contains magnesium, titanium, a halogen atom, and an electron donor as an indispensable component, and (\*\*) — an organoaluminium compound and (Ha) the following general formula [0033]

[Formula 1]



Desired atactic polypropylene can be obtained by carrying out the polymerization of the propylene under existence of the catalyst which consists of combination of an alkoxy group content aromatic compound expressed with [the alkyl group of carbon numbers 1-20 and R2 are [ the integer of 1-6 and n of the hydrocarbon group of 1-10, a hydroxyl group or a nitro group, and m ] 0 or 1 - (6-m) an integer for R1 in a formula].

[0034] And atactic polypropylene is fusibility, and 25,000 more than number average molecular weight (Mn) is in an ebullition heptane in the range of 30,000-60,000 preferably, and the thing of the range of 2-6 is preferably used for the ratio (Mw/Mn) of weight average molecular weight (Mw) and number average molecular weight (Mn) seven or less. Moreover, the thing whose melt flow rates (MFR) are 0.1-4g / 10 minutes and whose isotactic polypropylene is insolubility at an ebullition heptane is used.

[0035] The elasticity polypropylene sheet (it considers as an elasticity PP sheet below) which consists of mixture of the above-mentioned atactic polypropylene and isotactic polypropylene Elongation after fracture (TB) preferably 400% or more 500 - 700%, the residual elongation after 100% expanding (PS100) — 80% or less — desirable — the time of 50 - 75%, and a fracture — the time of stress (MB) and a breakdown — a ratio with stress (MY) — MB/MY It is desirable for 1.0 or more to be in the range of 1.5-3.5 preferably. If such kinetic property deviates from said range, the purpose of this invention will no longer be attained fully.

[0036] The atactic polypropylene which constitutes the above-mentioned elasticity PP sheet As for less than 25,000 thing or the thing to which a Mw/Mn ratio exceeds 7, number average molecular weight (Mn) the time of the fracture of PP sheet with which the kinetic property of this atactic polypropylene was not enough demonstrated, but was acquired — the time of stress (MB) and a breakdown — a ratio with stress (MY) — MB/MY It becomes less than 1.0. More than 80%, the purpose of this invention is not attained for the residual elongation after 100% expanding (PS100). Moreover, MFR of isotactic polypropylene has a low melting property at less than 0.1, and sheet forming becomes difficult. Moreover, if MFR exceeds 4g / 10 minutes, a mechanical strength will become inadequate and V cut processing suitability will fall.

[0037] The above-mentioned atactic polypropylene may be the homopolymer of a propylene, and may be a propylene copolymer containing the monomer of a propylene, and the alpha olefin unit of 40 or less % of the weight of other carbon numbers 2-30. Moreover, one sort of atactic polypropylene may be used and may combine two or more sorts.

[0038] Moreover, the above-mentioned isotactic polypropylene may be the homopolymer of the propylene which has stereoregularity, and may be the copolymer of the propylene which has this stereoregularity, and other alpha olefins. As other alpha olefins used for this copolymer, ethylene, butene-1, a pentene -1, a hexene -1, a heptene -1, and octene-1 grade are desirable, and ethylene and butene-1 are suitable especially, for example. Moreover, the block copolymer and random copolymer which usually contain other

aforementioned alpha olefin units 30 or less % of the weight preferably 40 or less % of the weight as a copolymer are used. As a desirable thing of isotactic polypropylene, the random copolymer or block copolymer of the propylene and ethylene which contain 3 – 25 % of the weight preferably is mentioned a propylene homopolymer and 1 – 30 % of the weight of ethylene units. About the manufacture method of such isotactic polypropylene, there is especially no limit and it can be conventionally performed like manufacture of crystalline polypropylene.

[0039] In the transparent elasticity PP sheet used for this invention, the atactic polypropylene of the mixed rate of isotactic polypropylene and atactic polypropylene is 25 – 80 % of the weight preferably ten to 90% of the weight, and eye SOKUTA theque polypropylene is 75 – 20 % of the weight preferably 90 to 10% of the weight to this. (It is indicated by details at JP,6-23278,B.)

atactic polypropylene — less than 10 % of the weight — the time of a breakdown of resin — stress (MY) — large — becoming — passing — the time of a fracture — the time of stress (MB) and a breakdown — a ratio with stress (MY) — MB/MY It becomes less than 1.0, and the residual elongation after 100% expanding (PS100) also becomes larger than 80%, and the purpose of this invention is not attained. if atactic polypropylene, on the other hand, exceeds 90 % of the weight — the time of a fracture — stress (MB) — small — becoming — passing — the time of a fracture — the time of stress (MB) and a breakdown — a ratio with stress (MY) — MB/MY It becomes less than 1.0, and a mechanical strength falls, and the purpose of this invention is not attained too.

[0040] the especially desirable mixing ratio of the atactic polypropylene and isotactic polypropylene in an elasticity PP sheet — a rate is \*\* 1:1, and if the ratio of an isotactic polypropylene component makes it high, the Young's modulus of the elasticity polypropylene obtained will become high. In order to reinforce the function called for as a surface layer of a makeup sheet, various additives, reinforcing materials, a bulking agent, for example, an ultraviolet ray absorbent, light stabilizer, a heat-resistant stabilizer, an antioxidant, an antistatic agent, a flame retarder, etc. are added by this blend polypropylene.

[0041] a thing for an ultraviolet ray absorbent and light stabilizer to give weatherability (lightfastness) with resin — it is — the addition — an ultraviolet ray absorbent and light stabilizer — it is both about 0.01 – 1.5 % of the weight. Generally, it is desirable to use together an ultraviolet ray absorbent and light stabilizer. As an ultraviolet ray absorbent, inorganic substances, such as the organic substance, such as benzotriazol, a benzophenone, and salicylate, or a zinc oxide of the shape of a particle 0.2 micrometers or less, cerium oxide, and titanium oxide, can also be used. As a stabilizer, radical scavengers, such as hindered amine system radical scavengers, such as screw-(2, 2, 6, 6, - tetramethyl-4-piperidiny) sebacate, and a piperidine system radical scavenger, can be used.

[0042] the mixture which added various additives, such as an ultraviolet ray absorbent and light stabilizer, in the elasticity polypropylene which consists of mixed stock of the above-mentioned isotactic polypropylene and atactic polypropylene — well-known methods, such as the calender method, — following — producing a film — colorlessness or coloring — a transparent elasticity PP sheet is produced. Although the thickness of an elasticity PP sheet is used in 50–200 micrometers, it is about 80–100 micrometers preferably. Easy adhesiveness processing of formation of corona discharge treatment, plasma treatment, and an easy-bonding layer etc. is preferably performed to the contact surface with the coloring sheet base material (coloring PO sheet) of this transparence PP sheet like the case of a coloring PO sheet.

[0043] Generally the laminating of the above-mentioned coloring PO sheet and the transparent elasticity PP sheet is carried out by the dry lamination process with adhesives. Although 2 liquid hardening mold polyurethane resin and polyester resin which use isocyanate as a curing agent are used as typical adhesives by the dry lamination process, rubber system resin, polyester resin, etc. are used. Moreover, it is also laminable by the melting extrusion process (the extrusion method), the heat welding method by the heat press, etc. When ornament processing is prepared in a coloring PO sheet, an ornament layer needs to be seen through a glue line from a surface transparence PP sheet side, and transparency is required of a glue line. However, when ornament processing is prepared in the rear face of a transparent elasticity PP sheet, a glue line may be transparent, or may be opaque, or whichever is sufficient as it.

[0044] Although all well-known embossing methods can use embossing conventionally, the sheet of the usual heat press method or a rotary formula embossing machine is used, for example. Moreover, when carrying out the heat lamination of the coloring PO sheet and transparence PP sheet which were printed, irregularity can also be formed with the so-called doubling embossing method which uses the embossing

version and performs embossing to a surface transparence PP sheet at coincidence. Although the depth of an embossing crevice changes with patterns that it is expressed by embossing etc., in order to express a good feeling of irregularity on the makeup sheet surface, its about 30–80 micrometers are desirable.

[0045] an embossing pattern — the conduit of grain — the thing expressing the texture on the surface of wood, such as annual-rings irregularity of a slot and a \*\*\*\* grain board, — The thing reproducing the gloss condition of a paint board or the thing which combined them, others, A hairline, the sands, crepe, a abstract pattern, the grain pattern expressing the texture of the stone board surfaces, such as a granite board, and the texture pattern expressing the surface texture of a textile, the leather \*\* pattern expressing the texture of a leather side, etc. can be used.

[0046] Although the coloring ink used as wiping ink with which said embossing crevice is filled up is selected according to a use from the ink which becomes the vehicle of urethane resin, acrylic resin, polyester resin, and other ink in ordinary use from coloring agents, such as the usual pigment and a color, an extender, a curing agent, an additive, a solvent, etc., its ink of a 2 liquid hardening mold is desirable in respect of adhesion and solvent resistance. Moreover, the wiping method is good by all of the well-known wiping methods currently used from the former, such as a doctor blade method and the roll coat method.

[0047] The following is taken into consideration as a selection criterion at the time of the antistatic agent used for this invention using this for resin. \*\* That durability is in antistatic ability, stable at \*\* fabrication temperature (140–350 degrees C), \*\* It dissolves moderately with not promoting the pyrolysis of resin, and \*\* resin, and there is little exudation after shaping, \*\* that there are little being effective and \*\* toxicity and they are cheap in small quantity (0.1–3.0PHR), that it is \*\* water resisting property, and \*\* — it is, not spoiling engine performance, such as printing nature and an adhesive property, in addition to this etc., in addition take a color tone, transparency, etc. into consideration if needed. As a typical antistatic agent, there are a surfactant and a conductive bulking agent which consists of \*\*\*\* of conductive material (solid-state).

[0048] Usually, if in the case of a surfactant there are many water-soluble antistatic agents, therefore they rinse, a surface antistatic agent will disappear, but since it oozes out on the surface again with the passage of time, durable prevention ability is obtained. This exudation nature is most greatly influenced by the compatibility of an antistatic agent and plastics, and the glass transition temperature (T<sub>g</sub>) of plastics. If compatibility is good, there is little exudation to the surface, and in order to distribute to homogeneity, it will be hard to reach the concentration in which antistatic ability appears.

[0049] On the other hand, when compatibility is bad, the smeariness and the chalking phenomenon to the surface will be caused. Moreover, a scour lump becomes impossible when compatibility is extremely bad. Therefore, the moderate compatibility of an antistatic agent and plastics serves as a conclusive factor of antistatic ability. Generally the balance of this compatibility is predicted using the dissolution parameter (SP value). That is, things with near SP value are dissolved mutually, and the solubility with the more nearly mutual larger thing of the difference of SP value is considered to fall, and is used as a temporary standard.

[0050] The exudation speed to the surface changes a lot bordering on T<sub>g</sub> of plastics. In the case of polyolefine and fluorine system resin with T<sub>g</sub> lower than a room temperature, as for the polymer molecule, the segment is carrying out thermal motion also at the room temperature, and the shift to the surface of an antistatic agent becomes easy by this movement. On the other hand, segmental motion is frozen for rigid polyvinyl chloride with T<sub>g</sub> higher than a room temperature, polystyrene, polymethylmethacrylate, a polycarbonate, polyester, ABS plastics, etc. in the room temperature, and the shift to the surface of an antistatic agent is very difficult. In the case of the former, even if an antistatic agent disappears by surface washing, friction, etc., antistatic ability is recovered for a short time, but in the case of the latter, if an antistatic agent is removed, there is almost no exudation from the interior and recovery of antistatic ability cannot be expected.

[0051] An antistatic agent (surfactant) is classified into an anion system, a cation system, a non-ion system, and a both-sexes system as shown in drawing 10 . Although a cation system antistatic agent is the most effective also in it, since decomposition of a polyvinyl chloride is promoted, the use takes cautions. A non-ion system antistatic agent is inferior in an effect as compared with a cation system, and although it must use about twice for acquiring an equivalent effect, since there are few problems, it is used abundantly. However, when there is much amount used, since the exudation to the surface may be severe and secondary pollution may be produced with the fall of physical properties, cautions are required. Since

an effect changes with the class of plastics, the class of other compounding agents, the shaping methods (injection molding, extrusion molding, blow molding, a vacuum forming, calendering, etc.), process conditions, etc., in use, the class of antistatic agent and selection of an amount are important for the antistatic agent for the interior.

[0052] Moreover, as a conductive bulking agent, it consists of material, such as metals, such as aluminum, nickel, silver, and copper, ITO (indium oxide tin), and a graphite, and a configuration is the shape of a scale, the piece of a foil, an abbreviation spherical particle, or a staple fiber. However, generally it is coloring, and since transparency is also low, when making an issue of the appearance design of a moldings, it is necessary to choose these conductive bulking agents in consideration of the point.

[0053] The laminating of the antistatic nature makeup sheet of this invention can also be carried out to other adherends (lining material). As adherend, plates, such as a plate of various materials and a shell, a sheet (or film), or various solid configuration goods (mold goods) are applicable. The laminating of the antistatic nature makeup sheet of this invention is carried out to various adherends, it performs predetermined fabrication etc., and is used for various kinds of uses. For example, it can use for makeup of the interior of vehicles, such as surface makeup of the cabinet of furniture, such as surface makeup of fittings, such as a housing device used in the interior of buildings, such as a wall, a ceiling, and a floor, a bathroom, a washroom, a kitchen, etc., a window frame, a door, and a balustrade, a desk, a table, and a wardrobe, or weak electric current and OA equipment, an automobile, and a train, the interior of the aircraft, and Therefore, when an antistatic nature makeup sheet cannot paste a direct material etc., adherend is pasted through a suitable easy-bonding layer or an adhesives layer. However, when an antistatic nature makeup sheet can paste adherend by heat welding etc., an easy-bonding layer or an adhesives layer may be omitted.

[0054] As adherend, resin, such as metals, such as water quality boards, such as wood boards, such as a wood veneer, a wood plywood, a particle board, and a semi-gross density fiberboard (MDF), and a woody fiber board, iron, and aluminum, an acrylic, a polycarbonate, an ethylene-vinylacetate copolymer, ethylene vinyl acetate, polyester, polystyrene, polyolefine, ABS, phenol resin, a polyvinyl chloride, cellulose system resin, and rubber, is mentioned as a material used for either a plate or a sheet (film). As a plate or a material used as solid configuration goods, cement-ed ceramic industry system materials, such as cement, such as ceramics, such as glass and pottery, and ALC (firing light weight concrete), calcium silicate, and gypsum fibrosum, are chiefly mentioned as adherend. As a material chiefly used as a sheet (or film) as adherend, a nonwoven fabric or textile fabrics etc. which consists of fiber, such as papers, such as paper of fine quality and Japanese paper, carbon, asbestos, potassium titanate, glass, and synthetic resin, is mentioned.

[0055] As the laminating method to these various adherends, the method of \*\* of a degree - \*\* can be mentioned, for example. Namely, so that it may be indicated by the method of pressurizing in between and carrying out a laminating to a tabular base material with a pressurization roller through a \*\* adhesives layer, \*\* JP,50-19132,B, JP,43-27488,B, etc. After inserting a makeup sheet among sex both the metal mold of injection molding and carrying out injection restoration of the melting resin for both metal mold from the gate of closing and a male, So that it may be indicated by the so-called injection-molding coincidence laminating method which cools and carries out the adhesion laminating of the makeup sheet to shaping of resin mold goods and coincidence on the surface, \*\* JP,56-45768,B, JP,60-58014,B, etc. Opposite-less \*\* lays a makeup sheet through adhesives on the surface of mold goods, and carry out the laminating of the makeup sheet to the mold-goods surface by the differential pressure by vacuum suction from a mold-goods side. So that it may be indicated by the so-called vacuum press laminating method, \*\* JP,61-5895,B, JP,3-2666,B, etc. With the roller with which many sense differs, supplying a makeup sheet in the direction of a major axis of pillar-shaped base materials, such as a cylinder and a multiple pillar, through an adhesives layer in between So that it may be indicated by the so-called wrapping processing method which carries out pressurization adhesion and carries out the laminating of the sequential makeup sheet to two or more sides which constitute a pillar-shaped object, \*\* JP,15-31122,Y, JP,48-47972,A, etc. The laminating of the makeup sheet is first carried out to a tabular base material through an adhesives layer. Subsequently with the makeup sheet of a tabular base material, to the field of the opposite side After the cross section which reaches the interface of a makeup sheet and a tabular base material cut the shape of V character, and a U character-like slot and applies adhesives subsequently to in this slot, this slot is bent and the so-called V cut or the U cut processing method of fabricating a box or a pillar-shaped

object etc. is mentioned.

[0056] As a method of sticking the antistatic nature makeup sheet of this invention on a concavo-convex solid object especially, the wrapping processing method, the V cut processing method, the injection-molding coincidence laminating method, the vacuum-forming coincidence laminating method, etc. are desirable in said method.

[0057]

[Example] Below, based on an example, this invention is explained further at details.

(Example 1) As shown in drawing 7 (a), it is basis-weight 30 g/m<sup>2</sup> as a coloring sheet base material 11. As papers strengthening paper ("FIX30" by Sanko Paper Mfg. Co., Ltd.) was used, gravure was carried out using the ink (product made from Showa Ink Industry) which becomes this from a vinyl chloride vinyl acetate copolymer and acrylic resin and it was shown in drawing 7 (a), the ornament layer 12 was formed and the printing coloring sheet was produced. Using the resin which, on the other hand, added the surfactant ("TB-104" by Matsumoto Yushi-Seiyaku) which uses an alkylamine derivative as a principal component 0.7% of the weight to polyolefine system resin ("VL200" by Sumitomo Chemical Co., Ltd.), the sheet was produced by the T-die method with the extruder, and as shown in drawing 7 (b), the transparence PO sheet 13 containing with a thickness of 500 micrometers surfactant 14a was obtained.

[0058] Next, as shown in drawing 7 (c), the laminating of the transparence PO sheet 13 was carried out using the urethane system adhesives 16 the ornament layer 12 side of the above-mentioned coloring sheet base material 11, and the antistatic nature makeup sheet 1 was produced. The surface-electrical-resistance value of this antistatic nature makeup sheet 1 was 5x10<sup>11</sup>ohms. Therefore, when transparent protection layer was printed with a photogravure printing machine using the above-mentioned antistatic nature makeup sheet 1, it was charged only in about 800 V.

[0059] (Example 2) As coloring PO sheet 11a, the coloring polyolefine system resin sheet (product made from TATSUNO Chemistry "a tough par") with a thickness of 100 micrometers was used, gravure of the urethane system ink (product made from Showa Ink Industry) was used and carried out to this, the ornament layer 12 was formed, and as shown in drawing 8 (a), the printing coloring PO sheet was produced. To the ornament layer 12 side of the coloring PO sheet 11a, it is a surfactant (as the polyolefine system resin (product made from Idemitsu Petrochemistry "E-940") which added the "electro stripper TS" by Kao Corp. 0.3% of the weight was extruded by the T-die method, was laminated with an extruder and shown in drawing 8 (b), the laminating sheet which has the transparence PO sheet which contains a surfactant on the surface was produced.). furthermore, grain — as the embossing roll in which the embossing pattern of a conduit was formed was used, the above-mentioned laminating sheet was heated and pressurized and it was shown in drawing 8 (c), the embossing pattern 15 was formed in the transparence PO sheet 13 side of a laminating sheet, and the antistatic nature makeup sheet 1 which has the embossing pattern 15 was produced. The surface-electrical-resistance value of this antistatic nature makeup sheet was 3x10<sup>13</sup>ohms.

[0060] (Example 3) As high density polyethylene was used as the base, and the surfactant used in the example 2 was added into the resin mixture which added thermoplastic elastomer, the inorganic bulking agent, the color pigment, etc. to this 0.5% of the weight, this was extruded into it by the T-die method with an extruder and it was shown in it as a coloring sheet base material at drawing 9 (a), with a thickness of 200 micrometers coloring PO sheet 11a was produced. After performing corona discharge treatment to coloring PO sheet 11a containing this surfactant 14a, gravure was carried out to it using urethane system ink (product made from Showa Ink Industry), the ornament layer 12 was formed, and as shown in drawing 9 (b), the printing coloring PO sheet was produced.

[0061] The transparence PO sheet 13 which, on the other hand, contains with a thickness of 100 micrometers surfactant 14a like an example 2 using the resin which added the surfactant 0.7% of the weight to polyolefine system resin was produced. Next, as shown in drawing 9 (d), the laminating of the transparence PO sheet 13 was carried out to the above-mentioned coloring PO sheet 11a using urethane system adhesives, and the antistatic nature makeup sheet 1 which contains a surfactant on both coloring PO sheet 11a and the transparence PO sheet 13 was produced. The surface-electrical-resistance value of this antistatic nature makeup sheet 1 was 5x10<sup>11</sup>ohms.

[0062] (Example 1 of a comparison) Except not adding an antistatic agent on a transparence PO sheet, the makeup sheet was produced like the example 1 and it considered as the example 1 of a comparison.

(Example 2 of a comparison) Except not adding an antistatic agent on a transparence PO sheet, the



makeup sheet was produced like the example 2 and it considered as the example 2 of a comparison. [0063] (Antistatic performance test) A surface-electrical-resistance value and the coating weight of dust were measured about the makeup sheet produced in examples 1, 2, and 3 and the examples 1 and 2 of a comparison. Surface electrical resistance is measured based on JIS-K -6911. The coating weight of dust Cut out the makeup sheet produced in each example and each example of a comparison in a 5cmx5cm size, and it considers as a test piece. The transparence PO sheet 13 (in the case of example, transparence PO sheet containing antistatic agent is shown) side of each test piece The transparence PO sheet 13 side of each test piece was made to approach gradually the glass plate surface which covered the whole surface with the ashes of 10 round-trip grinding and a cigarette in paper (JK wiper of KURESHIYA Manufacture (trademark)), and the ashy adhesion condition was observed visually. The trial was performed in 20 degrees C and the ambient atmosphere of 60%RH. Moreover, when a photogravure printing machine performed an overprint coat to the transparence PO sheet side of a makeup sheet using rolling up of the makeup sheet produced in examples 1, 2, and 3 and the examples 1 and 2 of a comparison, the electrification voltage generated in Webb was measured.

[0064] (Test result) The result was as being shown in a table 2, each antistatic nature makeup sheet produced in the example was excellent in the antistatic effect, and did not have a trouble in a routing, either, and there was also little coating weight of dust. Therefore, when gravure of the antistatic nature makeup sheet of this invention was carried out in the state of Webb, according to the antistatic effect, its electrification voltage decreases, it does not have a possibility of sparking during presswork, and was able to be printed at high speed. Moreover, there was little coating weight of dust, and since adhering dust was also removed easily, most generating of the defective resulting from adhesion of dust was able to be abolished.

[0065]

[A table 2]

帯電防止性能試験結果			
試料	表面抵抗 [Ω]	ゴミの付着状態	印刷中のウェブ の帯電状態
実施例1の試料 実施例2の試料 実施例3の試料	$1 \times 10^{11}$ $3 \times 10^{13}$ $2 \times 10^{11}$	いずれも、灰と化粧シートとの距離を0cmに近づけても灰の付着なし	帯電0.8Vで、スパークの恐れなし、印刷続行
比較例1の試料 比較例2の試料	$1 \times 10^{18}$ $2 \times 10^{18}$	いずれも、距離10cmの段階で化粧シートの全面に灰が付着	帯電40kVで、スパークの恐れあり、印刷中断

[0066]

[Effect of the Invention] The antistatic nature makeup sheet of this invention has little surface electrical resistance, and since electrification voltage is small, in the production process after wiping processing, overprint, etc., its fear of an outbreak of the fire by static electricity disappears, and its working capacity improves [ be / it / under / by Webb / presswork / also setting ]. Moreover, since the antistatic nature makeup sheet of this invention can give the antistatic engine performance to the surface by sticking on all base materials, such as plastics, paper, wood, a metal plate, and an inorganic system material, it is a means very effective in giving the antistatic engine performance to the various supplies (an electric product, a cabinet, various instruments, etc.) used in the location which needs sanitary environment. For example, since the dust which adhered easily in wiping etc. can be removed while being able to lessen coating weight of dust when a makeup steel plate is produced using the antistatic nature makeup sheet of this invention and this makeup steel plate is used for the partition of a hospital, a screen, a handrail, etc., a clean condition is always maintainable. furthermore, the base material sheet which consists of coloring polyolefine system resin — colorlessness or coloring — even if the antistatic nature makeup sheet of this

invention which carried out the laminating of the surface sheet which consists of a transparent elasticity polypropylene resin carries out the laminating of this to adherend and performs V cut processing to this makeup material, a possibility of it of a crack arising on a surface sheet or milking is lost.

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[Translation done.]

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**TECHNICAL FIELD**

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[A technical field to which invention belongs] This invention relates to a makeup sheet available as a surface makeup sheet used for interior of a building, surface makeup of fittings, vehicles interior, etc.

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[Translation done.]

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**PRIOR ART**

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[Description of the Prior Art] Conventionally, the makeup sheet which prepared the surface resin layer which consists of thermoplastics in the surface of a base material sheet is well-known. For example, the makeup sheet which carried out the melting knockout of the thermoplastics, such as vinyl chloride system resin or polyolefine system resin, to the surface of porous base materials, such as paper which printed the pattern of arbitration, and a nonwoven fabric, and laminated it on it is indicated by JP,51-34967,A.

[0003] Moreover, the makeup sheet which used polyolefine system sheets, such as polyethylene and polypropylene, is proposed in recent years as what is replaced with vinyl chloride resin (refer to JP,54-62255,A). For example, carry out the laminating of a pattern printing layer, an adhesives layer, and the thermoplastic transparence elastomer film one by one to the surface of the sheet base material which consists of polyolefine system resin which has concealment nature, and perform embossing to a laminating and coincidence on it. The embossing makeup sheet (JP,6-79830,A) which prepared the embossing pattern in the surface, the makeup sheet (JP,6-79850,A) which prepared the pattern layer in the sheet base material which consists of polyolefine system resin which has concealment nature, prepared the embossing crevice by embossing while the transparence resin of a polyolefine system was extruded and laminated in this, and filled up this embossing crevice with coloring ink by wiping processing are proposed. Furthermore, the thing (JP,6-21080,A, JP,4-504384,A) which made the polyolefine system resin to which the graft polymerization of the polar functional group was carried out mix thermoplastic elastomer olefin, or the thing (JP,7-26038,A) which the compatibilizer was used [ thing ] for polyolefine system resin and mixed polyurethane resin is proposed as amelioration specification of said polyolefine system resin sheet.

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**EFFECT OF THE INVENTION**

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[Effect of the Invention] The antistatic nature makeup sheet of this invention has little surface electrical resistance, and since electrification voltage is small, in the production process after wiping processing, overprint, etc., its fear of an outbreak of the fire by static electricity disappears, and its working capacity improves [ be / it / under / by Webb / presswork / also setting ]. Moreover, since the antistatic nature makeup sheet of this invention can give the antistatic engine performance to the surface by sticking on all base materials, such as plastics, paper, wood, a metal plate, and an inorganic system material, it is a means very effective in giving the antistatic engine performance to the various supplies (an electric product, a cabinet, various instruments, etc.) used in the location which needs sanitary environment. For example, since the dust which adhered easily in wiping etc. can be removed while being able to lessen coating weight of dust when a makeup steel plate is produced using the antistatic nature makeup sheet of this invention and this makeup steel plate is used for the partition of a hospital, a screen, a handrail, etc., a clean condition is always maintainable. furthermore, the base material sheet which consists of coloring polyolefine system resin — colorlessness or coloring — even if the antistatic nature makeup sheet of this invention which carried out the laminating of the surface sheet which consists of a transparent elasticity polypropylene resin carries out the laminating of this to adherend and performs V cut processing to this makeup material, a possibility of it of a crack arising on a surface sheet or milking is lost.

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**TECHNICAL PROBLEM**

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[Problem(s) to be Solved by the Invention] However, dust and dust tend to adhere that static electricity tends to generate the makeup sheet which used a polyvinyl chloride and polyolefine system resin. Since surface electrical resistance is large, it may be easy to be charged, and static electricity may occur in an after [ wiping processing, an overprint coat (it considers as OP coat below), etc. ] production process, and especially the makeup sheet that used polyolefine system resin may cause an outbreak of a fire by the spark of the static electricity. Moreover, the electrified makeup sheet causes generating of a defective while dust and dust become easy to adhere and a sanitary problem arises. Usually, existing independently does not almost have microorganisms, such as bacteria in air, and mold, and since it adheres and exists in dust or dust in many cases, as for the conventional makeup sheet which is easy to be charged, bacteria, mold, etc. become is easy to be polluted.

[0005] It prevents adhesion of dust and dust while this invention forms the resin layer containing an antistatic agent in the surface of a makeup sheet, decreases the surface electrical resistance of a makeup sheet and prevents the outbreak of a fire by the spark of static electricity, in order to solve these problems. Furthermore, since wiping, rinsing, etc. can remove adhering dust and the adhering dust easily, the surface of a makeup sheet can maintain a clean condition over a long period of time.

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**MEANS**

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[Means for Solving the Problem] In order to solve the above-mentioned problem, a configuration of a makeup sheet was made to be the following. In a makeup sheet which carried out the laminating of a coloring sheet base material, an ornament layer, and the transparence resin layer, this transparence resin layer consisted of olefin system resin, and an antistatic agent was contained 0.1 to 1% of the weight, and it considered as an antistatic nature makeup sheet characterized by a surface-electrical-resistance value of this makeup sheet being 1014ohms or less. Moreover, said coloring sheet base material consisted of olefin system resin, and considered as an antistatic nature makeup sheet containing a coloring agent and an antistatic agent at least. Furthermore, using a surfactant as said antistatic agent, this surfactant has said olefin system resin and moderate compatibility, and selected what has a property which can move in the inside of olefin system resin.

[0007] That is, as a resin layer of the surface of a makeup sheet is formed using transparent olefin system resin which contains an antistatic agent 0.1 to 1% of the weight and a surface-electrical-resistance value of the makeup sheet surface is set to 1014ohms or less, it considers as a makeup sheet which has antistatic engine performance. Moreover, a makeup sheet is produced using olefin system resin which contains an antistatic agent not only in the surface of a makeup sheet but in a coloring sheet base material, and it considers as a makeup sheet which has antistatic engine performance. And a surfactant kneaded by olefin system resin carries out bleed out to the makeup sheet surface, and enables it to prevent electrification of the surface by selecting a surfactant which has olefin system resin and moderate compatibility as an antistatic agent, and has a property which can move freely in the inside of olefin system resin.

[0008]

[Embodiment of the Invention] Below, this invention is explained at details, making a drawing reference. Drawing 1 is type section drawing having shown an example of the antistatic nature makeup sheet of this invention. Drawing 2 is another mode of the antistatic nature makeup sheet of this invention, and is type section drawing of a resin sheet with the transparent surface, and the antistatic nature makeup sheet which contains an antistatic agent in both coloring sheet base materials. Drawing 3 is still more nearly another mode of the antistatic nature makeup sheet of this invention, and is type section drawing of the antistatic nature makeup sheet which formed the embossing pattern in the transparent resin sheet containing an antistatic agent. Drawing 4 is type section drawing of the antistatic nature makeup sheet when carrying out the laminating of the transparent resin sheet and transparent coloring sheet base material containing an antistatic agent through adhesives. Drawing 5 is type section drawing of the antistatic nature makeup sheet when making both a transparent resin sheet and a coloring sheet base material contain an antistatic agent, and carrying out the laminating of the sheet of these both through adhesives. Drawing 6 is explanatory drawing having shown an example when producing the antistatic nature makeup sheet of this invention. Drawing 7 is explanatory drawing when producing the antistatic nature makeup sheet of this invention according to an example 1. Drawing 8 is explanatory drawing when producing the antistatic nature makeup sheet of this invention according to an example 2. Drawing 9 is explanatory drawing when producing the antistatic nature makeup sheet of this invention according to an example 3. Drawing 10 is the table which classified the surfactant into the anion system, the cation system, the non-ion system, and the both-sexes system.

[0009] The makeup sheet (it only considers as an antistatic nature makeup sheet below) 1 which has the antistatic engine performance of this invention consists of a coloring sheet base material 11, an ornament

layer 12, and a transparent polyolefine system resin sheet (it considers as a transparency PO sheet below) 13 containing an antistatic agent 14, as shown in drawing 1 . Moreover, as shown in drawing 2 , it may consider as the antistatic nature makeup sheet 1 which consists of transparency PO sheets 13 which contain colored polyolefine system resin sheet (it considers as coloring PO sheet below) 11a containing an antistatic agent 14, the ornament layer 12, and an antistatic agent 14 as what contained the antistatic agent also in the coloring sheet base material. Furthermore, as shown in drawing 3 , the embossing pattern 15 may be formed in the transparency PO sheet containing an antistatic agent 14, and it may consider as the antistatic nature makeup sheet 1.

[0010] Moreover, as shown in drawing 4 , it may consist of the coloring sheet base material 11, an ornament layer 12, an adhesives layer 15, and a transparency PO sheet 13 containing an antistatic agent 14 as specification which laminates a coloring sheet base material and the transparency PO sheet containing an antistatic agent using adhesives. Furthermore, it may consist of the coloring sheet base material 11 using adhesives which contained the antistatic agent 14 as shown in drawing 5 as specification, an ornament layer 12, an adhesives layer 15, and a transparency PO sheet 13 containing an antistatic agent 14.

[0011] Below, the manufacture method of the antistatic nature makeup sheet of this invention is explained. First, as shown in drawing 6 (a), a coloring sheet is produced by the extruding method, the calender method, etc. as a coloring sheet base material 11 using the thermoplastics which blended the coloring agent, the inorganic bulking agent, etc. Subsequently, as a grain handle etc. is printed to this coloring sheet base material 11 by gravure etc. and it is shown in it at drawing 6 (b), the ornament layer 12 is formed. On the other hand, as shown in drawing 6 (c), an antistatic agent 14 is added in 0.1 – 1% of the weight of the range to polyolefine system resin, such as polyethylene and polypropylene, it sheet-izes by an extruding method etc. using the polyolefine system resin containing this antistatic agent, and the transparency PO sheet 13 containing an antistatic agent 14 is produced. Next, as shown in drawing 4 (d), the coloring sheet base material 11 which formed said ornament layer 12, and the transparency PO sheet 13 containing an antistatic agent 14 are stuck with a dry lamination process etc. through the adhesives layer 16, and the antistatic nature makeup sheet 1 is produced.

[0012] Moreover, after producing like the above the coloring sheet base material 11 which formed the ornament layer 12, and the transparency PO sheet 13 containing an antistatic agent 14, as the laminating of these both sheet is carried out and it is shown in drawing 3 by the doubling embossing method using an embossing roll, the antistatic nature makeup sheet 1 in which the embossing pattern was formed on the surface is also producible.

[0013] Furthermore, as another mode of this invention, using the polyolefine system resin which added the antistatic agent and the coloring agent, coloring PO sheet 11a is produced, and as mentioned above, by an extruding method etc., as shown in drawing 6 (a), as shown in drawing 6 (b), the ornament layer 12 is formed in coloring PO sheet base material 11a containing this antistatic agent. In the ornament layer 12 side of this coloring PO sheet 11a, the melting knockout of the polyolefine system resin containing an antistatic agent 14 can be carried out, it can be laminated, and an antistatic nature makeup sheet as shown in drawing 2 can also be produced. Moreover, after producing separately the transparency PO sheet 13 containing coloring PO sheet 11a containing an antistatic agent 14, and an antistatic agent 14 and forming the ornament layer 12 in coloring PO sheet 11a, the laminating of these both sheet can be carried out through the adhesives layer 16, and the antistatic nature makeup sheet 1 as shown in drawing 5 can also be produced.

[0014] As for the coloring sheet base material in this invention, fiber sheets, such as a polyolefine system resin sheet, a film (a film shall also be included when calling it a sheet in this invention below), or paper, are used. As resin of a polyolefine system resin sheet, polyethylene (it considers as Following PE), polypropylene PIRENN (it considers as Following PP), ethylene propylene rubber, an ethylene butene-1 copolymer, a propylene butene-1 copolymer, polybutene 1, the 3 yuan copolymer of butene-1 propylene ethylene, the 3 yuan copolymer of butene-1 hexene 1 and octene 1, the poly methyl pentene, polyolefine system thermoplastic elastomer, etc. are mentioned. These resin may be independent or may be mixed two or more sorts.

[0015] In this invention, the coloring agent which becomes the above-mentioned polyolefine system resin from a pigment or a color is blended, a sheet is produced by extruding etc. using this coloring resin, and it is used as a coloring sheet. The thickness of a sheet excels [ micrometers / about 50-500 ] in the

direction of a non-extended sheet in respect of shaping fitness etc. in post processing of a makeup sheet, such as V cut processing, although both an extension sheet and a non-extended sheet are usable. coloring of a sheet — a use — responding — transparence coloring and opacity (concealment) coloring — although either is usable, it is necessary to conceal the surface of adherend and, generally opaque coloring is desirable.

[0016] Moreover, to a coloring sheet base material, extenders (bulking agent), such as a calcium carbonate, an alumina (aluminum oxide), and a barium sulfate, or a foaming agent, a flame retarder, a thermostabilizer, an ultraviolet ray absorbent, etc. may be added if needed. As the above-mentioned coloring agent, the pearly luster pigment which consists of \*\*\*\*, such as metal pigments, such as organic pigments, such as inorganic pigment [ , such as a titanium white, a zinc white, rouge, a vermilion, ultramarine blue, cobalt blue, Titanium Yellow, and carbon black, ], isoindolinone, Hansa yellow A, Quinacridone, and Permanent Red 4R and copper phthalocyanine blue, or a color, aluminum, and brass, a titanium-dioxide covering mica, and basic zinc carbonate, is used.

[0017] Although the above-mentioned polyolefine system resin is used also in itself, in order to give flexibility, shock resistance, and easy adhesiveness to polyolefin resin, it may add various rubber preferably. As rubber, although it is diene system rubber, hydrogenation rubber, a polyolefine system elastomer, etc., hydrogenation diene system rubber is desirable especially.

[0018] Hydrogenation diene system rubber makes it come to a part of double bond [ at least ] of a diene system rubber molecule to add a hydrogen atom, is used as a modifier of polyolefine system resin, suppresses crystallization of polyolefine system resin, and has the role which makes flexibility and transparency raise. Generally, for the double bond of diene system rubber, if diene system rubber is added to polyolefine system resin, although weatherability and thermal resistance fall from additive-free polyolefine system resin, in order to saturate the double bond of diene system rubber with hydrogenation, they will not have the weatherability of polyolefine system resin, and a heat-resistant fall, either, and will become good by this invention.

[0019] As the above-mentioned diene system rubber, there are polyisoprene rubber, butadiene rubber, isobutylene isoprene rubber, propylene butadiene rubber, acrylonitrile-butadiene rubber, acrylonitrile polyisoprene rubber, styrene-butadiene rubber, etc. From the purpose of this invention, styrene-butadiene rubber is desirable. As an addition, 1 – 90 weight section degree is good to the polyolefine system resin 100 weight section. If an addition is under 1 weight section, the elasticity by rubber addition, a pace of expansion, and shock resistance run short, in the case of bending processings, such as V cut processing and spinning, it will become easy to produce a crack and a crack and the addition effect of diene system rubber will not show up. Moreover, if an addition exceeds 90 weight sections, elasticity and a pace of expansion become [ become large too much and / aim doubling at the time of printing ] difficult and are not desirable.

[0020] It is the elastic copolymer which added two kinds or three sorts or more of olefins, and at least one sort of polyenes which may be copolymerized as a polyolefine system elastomer, and ethylene, a propylene, an alpha olefin, etc. are used and, as for an olefin, 1, 4 hexadiene, annular diene, norbornene, etc. are used as a polyene. As a desirable olefin system copolymer, the elastic copolymer which uses olefins, such as ethylene propylene copolymer rubber, an ethylene propylene and nonconjugated diene rubber, and ethylene butadiene copolymer rubber, as a principal component is mentioned, for example. As an addition of a polyolefine system elastomer, it is about 30 % of the weight preferably ten to 60% of the weight in a base material. At less than 10 % of the weight, change of ductility becomes steep too much at the time of a fixed load, and ductility and a shock-proof fall arise at the time of a fracture. If an addition exceeds 60 % of the weight, transparency, weatherability, and creep resistance will fall.

[0021] Furthermore, the sheet with which a good better thing consists of high-density-polyethylene resin, a thermoplasticity nature elastomer, a coloring agent, and an inorganic bulking agent is mentioned as a base material sheet of this invention. If [ above-mentioned ] high density polyethylene RENTO is carried out, specific gravity is polyethylene of 0.94–0.96, it is manufactured by the low voltage method, and degree of crystallinity is high and the thing of the molecular structure with little branching is used for a molecule. Moreover, as the above-mentioned thermoplastic elastomer, diene system rubber, hydrogenation diene system rubber, a polyolefine system elastomer, etc. are used. As an addition of thermoplastic elastomer, it is about 30 % of the weight preferably ten to 60% of the weight in a base material. At less than 10 % of the weight, change of ductility becomes steep too much at the time of a fixed load, and ductility and a shock-

proof fall arise at the time of a fracture. If an addition exceeds 60 % of the weight, transparency, weatherability, and creep resistance will fall.

[0022] As an inorganic bulking agent added to high density polyethylene, powder, such as a calcium carbonate, a barium sulfate, clay, and talc, is used. As an addition, it is about 30 % of the weight preferably five to 60% of the weight in a base material sheet. At less than 5 % of the weight, creep-proof deformans and easy adhesiveness fall, and if it exceeds 60 % of the weight, ductility and a shock-proof fall will arise at the time of a fracture. The same thing as the above is used as a coloring agent.

[0023] To said polyolefine system resin, a coloring agent, various rubber or a polyolefine system elastomer, an inorganic bulking agent, etc. are added, and it considers as resin mixture, and sheet-izes according to well-known methods, such as an extrusion process or the calender method, using this resin mixture, and an opaque coloring PO sheet is produced to it. Although the thickness of a coloring PO sheet is used in 50–500 micrometers, it is about 100–200 micrometers preferably.

[0024] In order to improve adhesive strength with printing ink, transparent PO sheet, and adhesives, easy adhesiveness processing of formation of corona discharge treatment, plasma treatment, and an easy-bonding layer etc. is performed to the surface of the above-mentioned coloring PO sheet used for this invention. Although the coating liquid which dissolved resin, such as acrylic resin, urethane system resin, vinyl chloride vinyl acetate copolymer system resin, polyester resin, polyurethane resin, chlorinated polyethylene, and chlorination polypropylene, in the solvent is used as an easy-bonding layer (it is also called a primer layer or a support layer), the thing especially using polyurethane resin is desirable. It applies and dries by the well-known method, and let the coating liquid which dissolved the above-mentioned resin in the solvent be an easy-bonding layer.

[0025] As a fiber sheet used as a base material sheet, they are a basis weight 50 – 150 g/m<sup>2</sup>. The sheet which consists of paper, textile fabrics, or a nonwoven fabric is mentioned. The thickness can be chosen from the range of 50–300 micrometers according to a use. As fiber simple material which constitutes a fiber sheet, the fiber of an inorganic system which consists of the synthetic fiber of nature systems of organic, such as natural fibers, such as cellulose pulp, hemp, and cotton, nylon, polypropylene, and polyester, asbestos, glass, a quartz, carbon, potassium titanate, etc. is mentioned. In addition, the fiber base material sheet using cellulose pulp fiber is the so-called paper, and, specifically, paper of fine quality, kraft paper, Japanese paper, etc. are mentioned. When a base material sheet is a nature fiber sheet of organic, as a flame retarder, phosphoric-acid compounds, such as aluminum-hydroxide powder or aziridinyl phosphine oxide, etc. are mixed, and fireproofing is performed.

[0026] An ornament layer is formed in a coloring sheet base material of printing etc. at one side. As an ornament layer, there are a printing pattern by printing, an embossing pattern by embossing, and a concavo-convex pattern by hairline processing, the crevice of a concavo-convex pattern can be further filled up with coloring ink by the well-known wiping processing method, and an ornament layer can also be formed. As a printing pattern, there is a grain handle, a grain handle, a texture handle, a hide variegated pattern, a geometric figure, an alphabetic character, a mark, various abstract patterns, or whole surface solid printing. The concealment layer of whole surface solid printing may be omitted according to the surface state of the adherend which sticks a makeup sheet.

[0027] As ink of encaustic printing, although it changes with the quality of the materials and the gestalten of a printing base material (a coloring PO sheet or transparent PO sheet), generally, homopolymers, such as nitrocellulose, cellulose acetate, a vinyl chloride vinyl acetate copolymer, a polyvinyl butyral, urethane resin, acrylic resin, and polyester resin, or a polymer with other monomers is used as a vehicle, and the ink which consists of coloring agents, such as this, the usual pigment, and a color, an extender, a curing agent, an additive, a solvent, etc. is used. Especially, ink excellent in thermal resistance and weatherability is suitably selected by the makeup sheet of this invention according to a use.

[0028] As printing of a pattern, the usual printing methods, such as gravure, intaglio printing, offset printing, letterpress printing, flexographic printing, silk screen printing, electrostatic printing, and ink jet printing, can be used. Or a pattern pattern may once be independently formed on a mold-release characteristic sheet, an imprint sheet may be created, and encaustic printing may be imprinted and prepared with the decalcomania method from the obtained imprint sheet. Moreover, instead of a printing pattern, metals, such as aluminum, chromium, gold, silver, and copper, can be formed in a coloring sheet base material or transparent PO sheet, a metal thin film can be formed in the whole surface or a partial target by vacuum deposition, sputtering, etc., and it can also consider as an ornament layer.

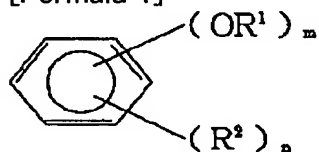
[0029] As a transparent olefin system resin layer (transparence PO sheet) in this invention, what uses polyolefin resin as a principal component is used. As resin of a transparence PO sheet, polyethylene (it considers as Following PE), polypropylene PIRENN (it considers as Following PP), ethylene propylene rubber, an ethylene butene-1 copolymer, a propylene butene-1 copolymer, polybutene 1, butene-1 propylene ethylene the copolymer of 3 yuan, butene-1 hexene 1, and octene the copolymer of 13 yuan, the poly methyl pentene, polyolefine system thermoplastic elastomer, etc. are mentioned. These resin may be independent or may be mixed two or more sorts.

[0030] Although the above-mentioned polyolefine system resin is used also in itself, in order to give flexibility, shock resistance, and easy adhesiveness to polyolefin resin, it may add various rubber preferably. As rubber, although it is diene system rubber, hydrogenation rubber, an olefin elastomer, etc., hydrogenation diene rubber is desirable especially. Hydrogenation diene system rubber makes it come to a part of double bond [ at least ] of a diene system rubber molecule to add a hydrogen atom, and is used as a modifier of polyolefine system resin. Crystallization of olefine resin is suppressed and there is a role which makes flexibility and transparency raise.

[0031] Generally, for the double bond of diene system rubber, if diene system rubber is added to polyolefine system resin, although weatherability and thermal resistance fall from additive-free polyolefine system resin, in order to saturate the double bond of diene system rubber with hydrogenation, they will not have the weatherability of polyolefine system resin, and a heat-resistant fall, either, and will become good by this invention. As the various rubber added to polyolefine system resin, and polyolefine system thermoplastic elastomer, the various above-mentioned rubber used for a coloring sheet base material and a polyolefine system elastomer can be used.

[0032] the colorlessness which has the composite construction which consists of mixed stock of atactic polypropylene and isotactic polypropylene as desirable resin of the transparence PO sheet in this invention, or coloring — transparent elasticity polypropylene resin is used. Atactic polypropylene can be manufactured by the well-known method (JP,63-243106,A). concrete — (\*\*) — the solid-state catalyst component which contains magnesium, titanium, a halogen atom, and an electron donor as an indispensable component, and (\*\*) — an organoaluminium compound and (Ha) the following general formula [0033]

[Formula 1]



Desired atactic polypropylene can be obtained by carrying out the polymerization of the propylene under existence of the catalyst which consists of combination of an alkoxy group content aromatic compound expressed with [the alkyl group of carbon numbers 1-20 and R2 are [ the integer of 1-6 and n of the hydrocarbon group of 1-10, a hydroxyl group or a nitro group, and m ] 0 or 1 - (6-m) an integer for R1 in a formula].

[0034] And atactic polypropylene is fusibility, and 25,000 more than number average molecular weight (Mn) is in an ebullition heptane in the range of 30,000-60,000 preferably, and the thing of the range of 2-6 is preferably used for the ratio (Mw/Mn) of weight average molecular weight (Mw) and number average molecular weight (Mn) seven or less. Moreover, the thing whose melt flow rates (MFR) are 0.1-4g / 10 minutes and whose isotactic polypropylene is insolubility at an ebullition heptane is used.

[0035] The elasticity polypropylene sheet (it considers as an elasticity PP sheet below) which consists of mixture of the above-mentioned atactic polypropylene and isotactic polypropylene Elongation after fracture (TB) preferably 400% or more 500 - 700%, the residual elongation after 100% expanding (PS100) — 80% or less — desirable — the time of 50 - 75%, and a fracture — the time of stress (MB) and a breakdown — a ratio with stress (MY) — MB/MY It is desirable for 1.0 or more to be in the range of 1.5-3.5 preferably. If such kinetic property deviates from said range, the purpose of this invention will no longer be attained fully.

[0036] The atactic polypropylene which constitutes the above-mentioned elasticity PP sheet As for less than 25,000 thing or the thing to which a Mw/Mn ratio exceeds 7, number average molecular weight (Mn) the time of the fracture of PP sheet with which the kinetic property of this atactic polypropylene was not enough demonstrated, but was acquired — the time of stress (MB) and a breakdown — a ratio with stress

(MY) — MB/MY It becomes less than 1.0. More than 80%, the purpose of this invention is not attained for the residual elongation after 100% expanding (PS100). Moreover, MFR of isotactic polypropylene has a low melting property at less than 0.1, and sheet forming becomes difficult. Moreover, if MFR exceeds 4g / 10 minutes, a mechanical strength will become inadequate and V cut processing suitability will fall.

[0037] The above-mentioned atactic polypropylene may be the homopolymer of a propylene, and may be a propylene copolymer containing the monomer of a propylene, and the alpha olefin unit of 40 or less % of the weight of other carbon numbers 2–30. Moreover, one sort of atactic polypropylene may be used and may combine two or more sorts.

[0038] Moreover, the above-mentioned isotactic polypropylene may be the homopolymer of the propylene which has stereoregularity, and may be the copolymer of the propylene which has this stereoregularity, and other alpha olefins. As other alpha olefins used for this copolymer, ethylene, butene-1, a pentene -1, a hexene -1, a heptene -1, and octene-1 grade are desirable, and ethylene and butene-1 are suitable especially, for example. Moreover, the block copolymer and random copolymer which usually contain other aforementioned alpha olefin units 30 or less % of the weight preferably 40 or less % of the weight as a copolymer are used. As a desirable thing of isotactic polypropylene, the random copolymer or block copolymer of the propylene and ethylene which contain 3 – 25 % of the weight preferably is mentioned a propylene homopolymer and 1 – 30 % of the weight of ethylene units. About the manufacture method of such isotactic polypropylene, there is especially no limit and it can be conventionally performed like manufacture of crystalline polypropylene.

[0039] In the transparent elasticity PP sheet used for this invention, the atactic polypropylene of the mixed rate of isotactic polypropylene and atactic polypropylene is 25 – 80 % of the weight preferably ten to 90% of the weight, and eye SOKUTA theque polypropylene is 75 – 20 % of the weight preferably 90 to 10% of the weight to this. (It is indicated by details at JP,6-23278,B.)

atactic polypropylene — less than 10 % of the weight — the time of a breakdown of resin — stress (MY) — large — becoming — passing — the time of a fracture — the time of stress (MB) and a breakdown — a ratio with stress (MY) — MB/MY It becomes less than 1.0, and the residual elongation after 100% expanding (PS100) also becomes larger than 80%, and the purpose of this invention is not attained. if atactic polypropylene, on the other hand, exceeds 90 % of the weight — the time of a fracture — stress (MB) — small — becoming — passing — the time of a fracture — the time of stress (MB) and a breakdown — a ratio with stress (MY) — MB/MY It becomes less than 1.0, and a mechanical strength falls, and the purpose of this invention is not attained too.

[0040] the especially desirable mixing ratio of the atactic polypropylene and isotactic polypropylene in an elasticity PP sheet — a rate is \*\* 1:1, and if the ratio of an isotactic polypropylene component makes it high, the Young's modulus of the elasticity polypropylene obtained will become high. In order to reinforce the function called for as a surface layer of a makeup sheet, various additives, reinforcing materials, a bulking agent, for example, an ultraviolet ray absorbent, light stabilizer, a heat-resistant stabilizer, an antioxidant, an antistatic agent, a flame retarder, etc. are added by this blend polypropylene.

[0041] a thing for an ultraviolet ray absorbent and light stabilizer to give weatherability (lightfastness) with resin — it is — the addition — an ultraviolet ray absorbent and light stabilizer — it is both about 0.01 – 1.5 % of the weight. Generally, it is desirable to use together an ultraviolet ray absorbent and light stabilizer. As an ultraviolet ray absorbent, inorganic substances, such as the organic substance, such as benzotriazol, a benzophenone, and salicylate, or a zinc oxide of the shape of a particle 0.2 micrometers or less, cerium oxide, and titanium oxide, can also be used. As a stabilizer, radical scavengers, such as hindered amine system radical scavengers, such as screw-(2, 2, 6, 6, - tetramethyl-4-piperidiny) sebacate, and a piperidine system radical scavenger, can be used.

[0042] the mixture which added various additives, such as an ultraviolet ray absorbent and light stabilizer, in the elasticity polypropylene which consists of mixed stock of the above-mentioned isotactic polypropylene and atactic polypropylene — well-known methods, such as the calender method, — following — producing a film — colorlessness or coloring — a transparent elasticity PP sheet is produced. Although the thickness of an elasticity PP sheet is used in 50–200 micrometers, it is about 80–100 micrometers preferably. Easy adhesiveness processing of formation of corona discharge treatment, plasma treatment, and an easy-bonding layer etc. is preferably performed to the contact surface with the coloring sheet base material (coloring PO sheet) of this transparence PP sheet like the case of a coloring PO sheet.



[0043] Generally the laminating of the above-mentioned coloring PO sheet and the transparent elasticity PP sheet is carried out by the dry lamination process with adhesives. Although 2 liquid hardening mold polyurethane resin and polyester resin which use isocyanate as a curing agent are used as typical adhesives by the dry lamination process, rubber system resin, polyester resin, etc. are used. Moreover, it is also laminable by the melting extrusion process (the extrusion method), the heat welding method by the heat press, etc. When ornament processing is prepared in a coloring PO sheet, an ornament layer needs to be seen through a glue line from a surface transparency PP sheet side, and transparency is required of a glue line. However, when ornament processing is prepared in the rear face of a transparent elasticity PP sheet, a glue line may be transparent, or may be opaque, or whichever is sufficient as it.

[0044] Although all well-known embossing methods can use embossing conventionally, the sheet of the usual heat press method or a rotary formula embossing machine is used, for example. Moreover, when carrying out the heat lamination of the coloring PO sheet and transparency PP sheet which were printed, irregularity can also be formed with the so-called doubling embossing method which uses the embossing version and performs embossing to a surface transparency PP sheet at coincidence. Although the depth of an embossing crevice changes with patterns that it is expressed by embossing etc., in order to express a good feeling of irregularity on the makeup sheet surface, its about 30–80 micrometers are desirable.

[0045] an embossing pattern — the conduit of grain — the thing expressing the texture on the surface of wood, such as annual-rings irregularity of a slot and a \*\*\*\* grain board, — The thing reproducing the gloss condition of a paint board or the thing which combined them, others, A hairline, the sands, crepe, a abstract pattern, the grain pattern expressing the texture of the stone board surfaces, such as a granite board, and the texture pattern expressing the surface texture of a textile, the leather \*\* pattern expressing the texture of a leather side, etc. can be used.

[0046] Although the coloring ink used as wiping ink with which said embossing crevice is filled up is selected according to a use from the ink which becomes the vehicle of urethane resin, acrylic resin, polyester resin, and other ink in ordinary use from coloring agents, such as the usual pigment and a color, an extender, a curing agent, an additive, a solvent, etc., its ink of a 2 liquid hardening mold is desirable in respect of adhesion and solvent resistance. Moreover, the wiping method is good by all of the well-known wiping methods currently used from the former, such as a doctor blade method and the roll coat method.

[0047] The following is taken into consideration as a selection criterion at the time of the antistatic agent used for this invention using this for resin. \*\* That durability is in antistatic ability, stable at \*\* fabrication temperature (140–350 degrees C), \*\* It dissolves moderately with not promoting the pyrolysis of resin, and \*\* resin, and there is little exudation after shaping, \*\* that there are little being effective and \*\* toxicity and they are cheap in small quantity (0.1–3.0PHR), that it is \*\* water resisting property, and \*\* — it is, not spoiling engine performance, such as printing nature and an adhesive property, in addition to this etc., in addition take a color tone, transparency, etc. into consideration if needed. As a typical antistatic agent, there are a surfactant and a conductive bulking agent which consists of \*\*\*\* of conductive material (solid-state).

[0048] Usually, if in the case of a surfactant there are many water-soluble antistatic agents, therefore they rinse, a surface antistatic agent will disappear, but since it oozes out on the surface again with the passage of time, durable prevention ability is obtained. This exudation nature is most greatly influenced by the compatibility of an antistatic agent and plastics, and the glass transition temperature (Tg) of plastics. If compatibility is good, there is little exudation to the surface, and in order to distribute to homogeneity, it will be hard to reach the concentration in which antistatic ability appears.

[0049] On the other hand, when compatibility is bad, the smeariness and the chalking phenomenon to the surface will be caused. Moreover, a scour lump becomes impossible when compatibility is extremely bad. Therefore, the moderate compatibility of an antistatic agent and plastics serves as a conclusive factor of antistatic ability. Generally the balance of this compatibility is predicted using the dissolution parameter (SP value). That is, things with near SP value are dissolved mutually, and the solubility with the more nearly mutual larger thing of the difference of SP value is considered to fall, and is used as a temporary standard.

[0050] The exudation speed to the surface changes a lot bordering on Tg of plastics. In the case of polyolefine and fluorine system resin with Tg lower than a room temperature, as for the polymer molecule, the segment is carrying out thermal motion also at the room temperature, and the shift to the surface of an antistatic agent becomes easy by this movement. On the other hand, segmental motion is frozen for



rigid polyvinyl chloride with Tg higher than a room temperature, polystyrene, polymethylmethacrylate, a polycarbonate, polyester, ABS plastics, etc. in the room temperature, and the shift to the surface of an antistatic agent is very difficult. In the case of the former, even if an antistatic agent disappears by surface washing, friction, etc., antistatic ability is recovered for a short time, but in the case of the latter, if an antistatic agent is removed, there is almost no exudation from the interior and recovery of antistatic ability cannot be expected.

[0051] An antistatic agent (surfactant) is classified into an anion system, a cation system, a non-ion system, and a both-sexes system as shown in drawing 10. Although a cation system antistatic agent is the most effective also in it, since decomposition of a polyvinyl chloride is promoted, the use takes cautions. A non-ion system antistatic agent is inferior in an effect as compared with a cation system, and although it must use about twice for acquiring an equivalent effect, since there are few problems, it is used abundantly. However, when there is much amount used, since the exudation to the surface may be severe and secondary pollution may be produced with the fall of physical properties, cautions are required. Since an effect changes with the class of plastics, the class of other compounding agents, the shaping methods (injection molding, extrusion molding, blow molding, a vacuum forming, calendering, etc.), process conditions, etc., in use, the class of antistatic agent and selection of an amount are important for the antistatic agent for the interior.

[0052] Moreover, as a conductive bulking agent, it consists of material, such as metals, such as aluminum, nickel, silver, and copper, ITO (indium oxide tin), and a graphite, and a configuration is the shape of a scale, the piece of a foil, an abbreviation spherical particle, or a staple fiber. However, generally it is coloring, and since transparency is also low, when making an issue of the appearance design of a moldings, it is necessary to choose these conductive bulking agents in consideration of the point.

[0053] The laminating of the antistatic nature makeup sheet of this invention can also be carried out to other adherends (lining material). As adherend, plates, such as a plate of various materials and a shell, a sheet (or film), or various solid configuration goods (mold goods) are applicable. The laminating of the antistatic nature makeup sheet of this invention is carried out to various adherends, it performs predetermined fabrication etc., and is used for various kinds of uses. For example, it can use for makeup of the interior of vehicles, such as surface makeup of the cabinet of furniture, such as surface makeup of fittings, such as a housing device used in the interior of buildings, such as a wall, a ceiling, and a floor, a bathroom, a washroom, a kitchen, etc., a window frame, a door, and a balustrade, a desk, a table, and a wardrobe, or weak electric current and OA equipment, an automobile, and a train, the interior of the aircraft, and Therefore, when an antistatic nature makeup sheet cannot paste a direct material etc., adherend is pasted through a suitable easy-bonding layer or an adhesives layer. However, when an antistatic nature makeup sheet can paste adherend by heat welding etc., an easy-bonding layer or an adhesives layer may be omitted.

[0054] As adherend, resin, such as metals, such as water quality boards, such as wood boards, such as a wood veneer, a wood plywood, a particle board, and a semi-gross density fiberboard (MDF), and a woody fiber board, iron, and aluminum, an acrylic, a polycarbonate, an ethylene-vinylacetate copolymer, ethylene vinyl acetate, polyester, polystyrene, polyolefine, ABS, phenol resin, a polyvinyl chloride, cellulose system resin, and rubber, is mentioned as a material used for either a plate or a sheet (film). As a plate or a material used as solid configuration goods, cement-ed ceramic industry system materials, such as cement, such as ceramics, such as glass and pottery, and ALC (firing light weight concrete), calcium silicate, and gypsum fibrosum, are chiefly mentioned as adherend. As a material chiefly used as a sheet (or film) as adherend, a nonwoven fabric or textile fabrics etc. which consists of fiber, such as papers, such as paper of fine quality and Japanese paper, carbon, asbestos, potassium titanate, glass, and synthetic resin, is mentioned.

[0055] As the laminating method to these various adherends, the method of \*\* of a degree - \*\* can be mentioned, for example. Namely, so that it may be indicated by the method of pressurizing in between and carrying out a laminating to a tabular base material with a pressurization roller through a \*\* adhesives layer, \*\* JP,50-19132,B, JP,43-27488,B, etc. After inserting a makeup sheet among sex both the metal mold of injection molding and carrying out injection restoration of the melting resin for both metal mold from the gate of closing and a male, So that it may be indicated by the so-called injection-molding coincidence laminating method which cools and carries out the adhesion laminating of the makeup sheet to shaping of resin mold goods and coincidence on the surface, \*\* JP,56-45768,B, JP,60-58014,B, etc.

Opposite-less \*\* lays a makeup sheet through adhesives on the surface of mold goods, and carry out the laminating of the makeup sheet to the mold-goods surface by the differential pressure by vacuum suction from a mold-goods side. So that it may be indicated by the so-called vacuum press laminating method, \*\* JP,61-5895,B, JP,3-2666,B, etc. With the roller with which many sense differs, supplying a makeup sheet in the direction of a major axis of pillar-shaped base materials, such as a cylinder and a multiple pillar, through an adhesives layer in between So that it may be indicated by the so-called wrapping processing method which carries out pressurization adhesion and carries out the laminating of the sequential makeup sheet to two or more sides which constitute a pillar-shaped object, \*\* JP,15-31122,Y, JP,48-47972,A, etc. The laminating of the makeup sheet is first carried out to a tabular base material through an adhesives layer. Subsequently with the makeup sheet of a tabular base material, to the field of the opposite side After the cross section which reaches the interface of a makeup sheet and a tabular base material cut the shape of V character, and a U character-like slot and applies adhesives subsequently to in this slot, this slot is bent and the so-called V cut or the U cut processing method of fabricating a box or a pillar-shaped object etc. is mentioned.

[0056] As a method of sticking the antistatic nature makeup sheet of this invention on a concavo-convex solid object especially, the wrapping processing method, the V cut processing method, the injection-molding coincidence laminating method, the vacuum-forming coincidence laminating method, etc. are desirable in said method.

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EXAMPLE

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[Example] Below, based on an example, this invention is explained further at details.

(Example 1) As shown in drawing 7 (a), it is basis-weight 30 g/m<sup>2</sup> as a coloring sheet base material 11. As papers strengthening paper ("FIX30" by Sanko Paper Mfg. Co., Ltd.) was used, gravure was carried out using the ink (product made from Showa Ink Industry) which becomes this from a vinyl chloride vinyl acetate copolymer and acrylic resin and it was shown in drawing 7 (a), the ornament layer 12 was formed and the printing coloring sheet was produced. Using the resin which, on the other hand, added the surfactant ("TB-104" by Matsumoto Yushi-Seiyaku) which uses an alkylamine derivative as a principal component 0.7% of the weight to polyolefine system resin ("VL200" by Sumitomo Chemical Co., Ltd.), the sheet was produced by the T-die method with the extruder, and as shown in drawing 7 (b), the transparence PO sheet 13 containing with a thickness of 500 micrometers surfactant 14a was obtained. [0058] Next, as shown in drawing 7 (c), the laminating of the transparence PO sheet 13 was carried out using the urethane system adhesives 16 the ornament layer 12 side of the above-mentioned coloring sheet base material 11, and the antistatic nature makeup sheet 1 was produced. The surface-electrical-resistance value of this antistatic nature makeup sheet 1 was 5x10<sup>11</sup>ohms. Therefore, when transparent protection layer was printed with a photogravure printing machine using the above-mentioned antistatic nature makeup sheet 1, it was charged only in about 800 V.

[0059] (Example 2) As coloring PO sheet 11a, the coloring polyolefine system resin sheet (product made from TATSUNO Chemistry "a tough par") with a thickness of 100 micrometers was used, gravure of the urethane system ink (product made from Showa Ink Industry) was used and carried out to this, the ornament layer 12 was formed, and as shown in drawing 8 (a), the printing coloring PO sheet was produced. To the ornament layer 12 side of the coloring PO sheet 11a, it is a surfactant (as the polyolefine system resin (product made from Idemitsu Petrochemistry "E-940") which added the "electro stripper TS" by Kao Corp. 0.3% of the weight was extruded by the T-die method, was laminated with an extruder and shown in drawing 8 (b), the laminating sheet which has the transparence PO sheet which contains a surfactant on the surface was produced.). furthermore, grain — as the embossing roll in which the embossing pattern of a conduit was formed was used, the above-mentioned laminating sheet was heated and pressurized and it was shown in drawing 8 (c), the embossing pattern 15 was formed in the transparence PO sheet 13 side of a laminating sheet, and the antistatic nature makeup sheet 1 which has the embossing pattern 15 was produced. The surface-electrical-resistance value of this antistatic nature makeup sheet was 3x10<sup>13</sup>ohms.

[0060] (Example 3) As high density polyethylene was used as the base, and the surfactant used in the example 2 was added into the resin mixture which added thermoplastic elastomer, the inorganic bulking agent, the color pigment, etc. to this 0.5% of the weight, this was extruded into it by the T-die method with an extruder and it was shown in it as a coloring sheet base material at drawing 9 (a), with a thickness of 200 micrometers coloring PO sheet 11a was produced. After performing corona discharge treatment to coloring PO sheet 11a containing this surfactant 14a, gravure was carried out to it using urethane system ink (product made from Showa Ink Industry), the ornament layer 12 was formed, and as shown in drawing 9 (b), the printing coloring PO sheet was produced.

[0061] The transparence PO sheet 13 which, on the other hand, contains with a thickness of 100 micrometers surfactant 14a like an example 2 using the resin which added the surfactant 0.7% of the weight to polyolefine system resin was produced. Next, as shown in drawing 9 (d), the laminating of the transparence PO sheet 13 was carried out to the above-mentioned coloring PO sheet 11a using urethane

system adhesives, and the antistatic nature makeup sheet 1 which contains a surfactant on both coloring PO sheet 11a and the transparence PO sheet 13 was produced. The surface-electrical-resistance value of this antistatic nature makeup sheet 1 was  $5 \times 10^{11} \text{ohms}$ .

[0062] (Example 1 of a comparison) Except not adding an antistatic agent on a transparence PO sheet, the makeup sheet was produced like the example 1 and it considered as the example 1 of a comparison.

(Example 2 of a comparison) Except not adding an antistatic agent on a transparence PO sheet, the makeup sheet was produced like the example 2 and it considered as the example 2 of a comparison.

[0063] (Antistatic performance test) A surface-electrical-resistance value and the coating weight of dust were measured about the makeup sheet produced in examples 1, 2, and 3 and the examples 1 and 2 of a comparison. Surface electrical resistance is measured based on JIS-K -6911. The coating weight of dust Cut out the makeup sheet produced in each example and each example of a comparison in a  $5 \text{cm} \times 5 \text{cm}$  size, and it considers as a test piece. The transparence PO sheet 13 (in the case of example, transparence PO sheet containing antistatic agent is shown) side of each test piece The transparence PO sheet 13 side of each test piece was made to approach gradually the glass plate surface which covered the whole surface with the ashes of 10 round-trip grinding and a cigarette in paper (JK wiper of KURESHIYA Manufacture (trademark)), and the ashy adhesion condition was observed visually. The trial was performed in 20 degrees C and the ambient atmosphere of 60%RH. Moreover, when a photogravure printing machine performed an overprint coat to the transparence PO sheet side of a makeup sheet using rolling up of the makeup sheet produced in examples 1, 2, and 3 and the examples 1 and 2 of a comparison, the electrification voltage generated in Webb was measured.

[0064] (Test result) The result was as being shown in a table 2, each antistatic nature makeup sheet produced in the example was excellent in the antistatic effect, and did not have a trouble in a routing, either, and there was also little coating weight of dust. Therefore, when gravure of the antistatic nature makeup sheet of this invention was carried out in the state of Webb, according to the antistatic effect, its electrification voltage decreases, it does not have a possibility of sparking during presswork, and was able to be printed at high speed. Moreover, there was little coating weight of dust, and since adhering dust was also removed easily, most generating of the defective resulting from adhesion of dust was able to be abolished.

[0065]

[A table 2]

帯電防止性能試験結果			
試料	表面抵抗 [Ω]	ゴミの付着状態	印刷中のウェブ の帯電状態
実施例1の試料 実施例2の試料 実施例3の試料	$1 \times 10^{11}$ $3 \times 10^{13}$ $2 \times 10^{11}$	いずれも、灰と化粧シートとの距離を0cmに近づけても灰の付着なし	帯電0.8Vで、スパークの恐れなし、印刷続行
比較例1の試料 比較例2の試料	$1 \times 10^{16}$ $2 \times 10^{18}$	いずれも、距離10cmの段階で化粧シート全面に灰が付着	帯電40kVで、スパークの恐れあり、印刷中断

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**DESCRIPTION OF DRAWINGS**

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**[Brief Description of the Drawings]**

[Drawing 1] It is type section drawing having shown an example of the antistatic nature makeup sheet of this invention.

[Drawing 2] In another mode of this invention, it is type section drawing of a surface transparence resin sheet and the antistatic nature makeup sheet which contains an antistatic agent in both coloring sheet base materials.

[Drawing 3] It is type section drawing of the antistatic nature makeup sheet which formed the embossing pattern in the transparent resin sheet containing an antistatic agent in still more nearly another mode of this invention.

[Drawing 4] It is type section drawing of the antistatic nature makeup sheet when carrying out the laminating of the transparent resin sheet and transparent coloring sheet base material containing an antistatic agent through adhesives.

[Drawing 5] It is type section drawing of the antistatic nature makeup sheet when making both a transparent resin sheet and a coloring sheet base material contain an antistatic agent, and carrying out the laminating of the sheet of these both through adhesives.

[Drawing 6] It is explanatory drawing when producing the antistatic nature makeup sheet of this invention.

[Drawing 7] It is explanatory drawing when producing an antistatic nature makeup sheet according to an example 1.

[Drawing 8] It is explanatory drawing when producing an antistatic nature makeup sheet according to an example 2.

[Drawing 9] It is explanatory drawing when producing an antistatic nature makeup sheet according to an example 3.

[Drawing 10] It is the table which classified the surfactant into the anion system, the cation system, the non-ion system, and the both-sexes system.

**[Description of Notations]**

1 Antistatic Nature Makeup Sheet

11 Coloring Sheet Base Material

11a Coloring PO sheet

12 Ornament Layer

13 Transparence PO Sheet

14 Antistatic Agent

14a Surfactant

15 Embossing Pattern

16 Adhesives Layer

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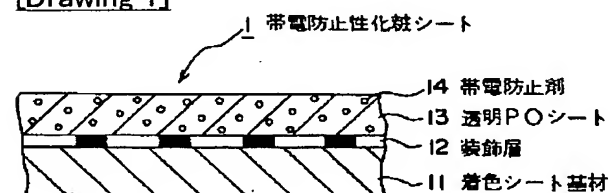
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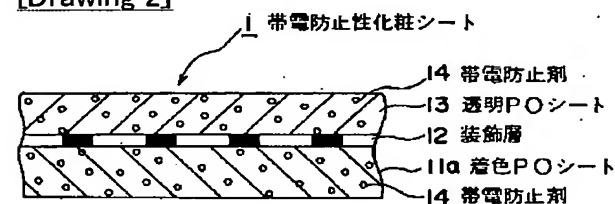
DRAWINGS

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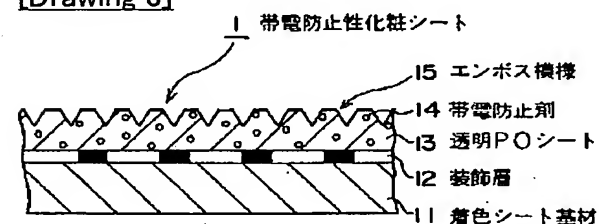
[Drawing 1]



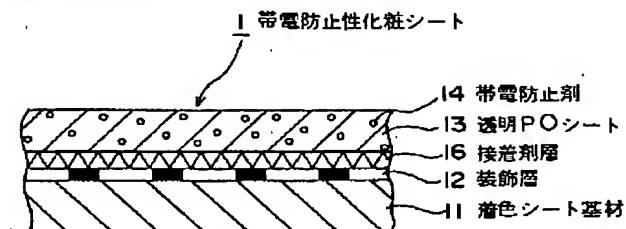
[Drawing 2]



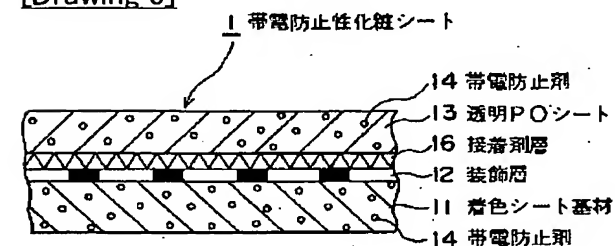
[Drawing 3]



[Drawing 4]

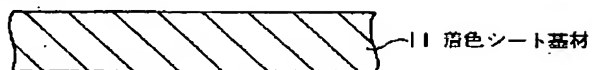


[Drawing 5]



[Drawing 6]

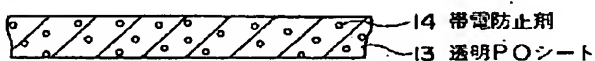
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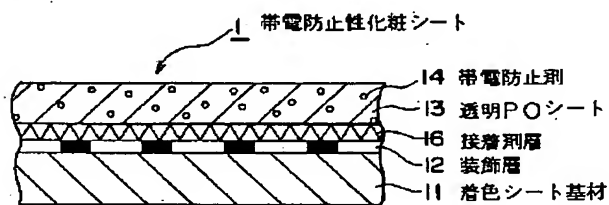
(b)



(c)



(d)

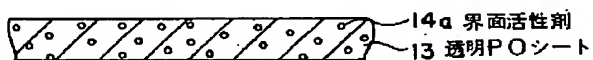


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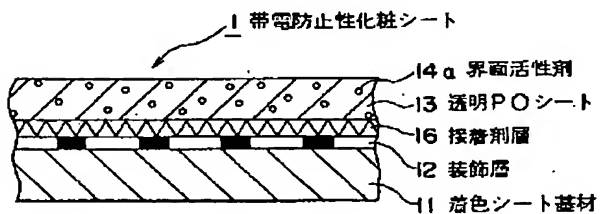
(a)



(b)



(c)



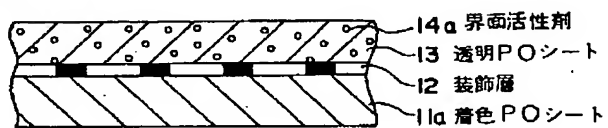
[Drawing 8]



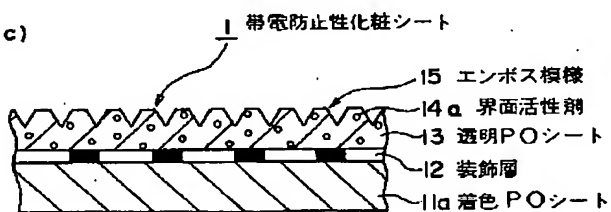
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(b)



(c)

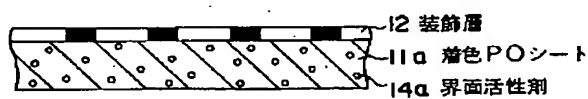


[Drawing 9]

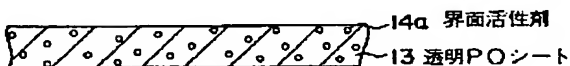
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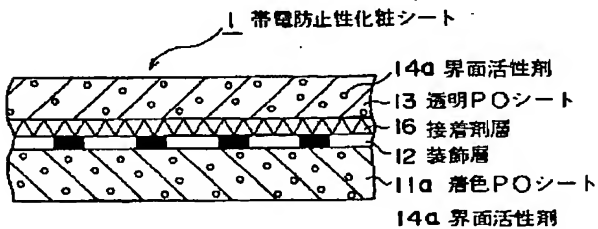
(b)



(c)



(d)



[Drawing 10]

帯電防止剤（界面活性剤）

種 類	型	例および構造式 <sup>a)</sup>
アニオン系	アルキルサルフェート型	$R_{12}O(C_2H_4O)_n-SO_3N(-C_2H_4OH)_3$ $R_{16}OSO_3NHC(=NH)-NHCONH_2$
	アルキルアリルサルフェート型	$R_9-\text{C}_6\text{H}_4-O(C_2H_4O)_n-SO_3N(-C_2H_4OH)_2$
	アルキルホスフェート型	$RO-P(=O)(RO)-O(C_2H_4O)_n-N(-C_2H_4OH)_2$
	アルキルアミンサルフェート型	$R_{16}NHC_2H_4OSO_2N(C_2H_4OH)_2$ $R_{12}CONHC_2H_4OSO_3Na$
カチオン系 <sup>b)</sup>	第四級アンモニウム塩型	$[R_{17}CONHC_3H_6N(CH_3)_2C_2H_4OH]^+X^-$ $X: NO_3, ClO_4$
	第四級アンモニウム樹脂型	$-CH_2-CH-$ $ $ $CONH-R-NX-(CH_3)_2^+Y^-$
	イミダゾリン型	$R_{17}-C \begin{matrix} \nearrow N-CH_2 \\ \searrow N^+-CH-CH_2COOH \\   \\ H \end{matrix} CH_2-CH_2OH$ $Y^-$
非イオン系 <sup>c)</sup>	ソルビタン型 エーテル型 アミンおよびアミド型 エタノールアミド型	ポリオキシエチレンソルビタンモノステアレート ポリオキシエチレンアルキルおよびアリルエーテル ポリオキシエチレンアルキルアミンおよびアミド $R_{17}CONH(C_2H_4O)_3H$
両性系	ベタイン型	$R_{18}-N^+(CH_3)_2-CH_2COO^-$ $R_{12}-N^+(-(CH_2CH_2O)_nH)_2-CH_2CH_2PO_3^{--}Na^+$

注 a) ここでRは炭素数任意の脂肪族炭化水素基を、例えばR<sub>12</sub>は炭素数12の脂肪族炭化水素基をさす。  
市販品には種類を表示しているが、化学構造を明らかにしていないものが多い。添加量は0.2～2部、硬質プラスチックに速効かつ効果的な防止剤はほとんどない。

b) カチオン系は効果が大きいので最もよく使われる。ただしPVCの場合は樹脂の熱分解と着色を促進するのでレコードを除いてあまり使われない。

c) ソルビタン型、エーテル型には着色の問題がないが、効果が小さいので添加量をやや多くする。